Telecommunications
Techniques
Corporation

Training Manual

TTC PRESENTS

FIREBERD 6000
BOARD LEVEL FACTORY
MAINTENANCE TRAINING
FOR
GE RENTALS

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A Dynatech Company

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Training Manual

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FIREBERD 6000 OVERVIEW

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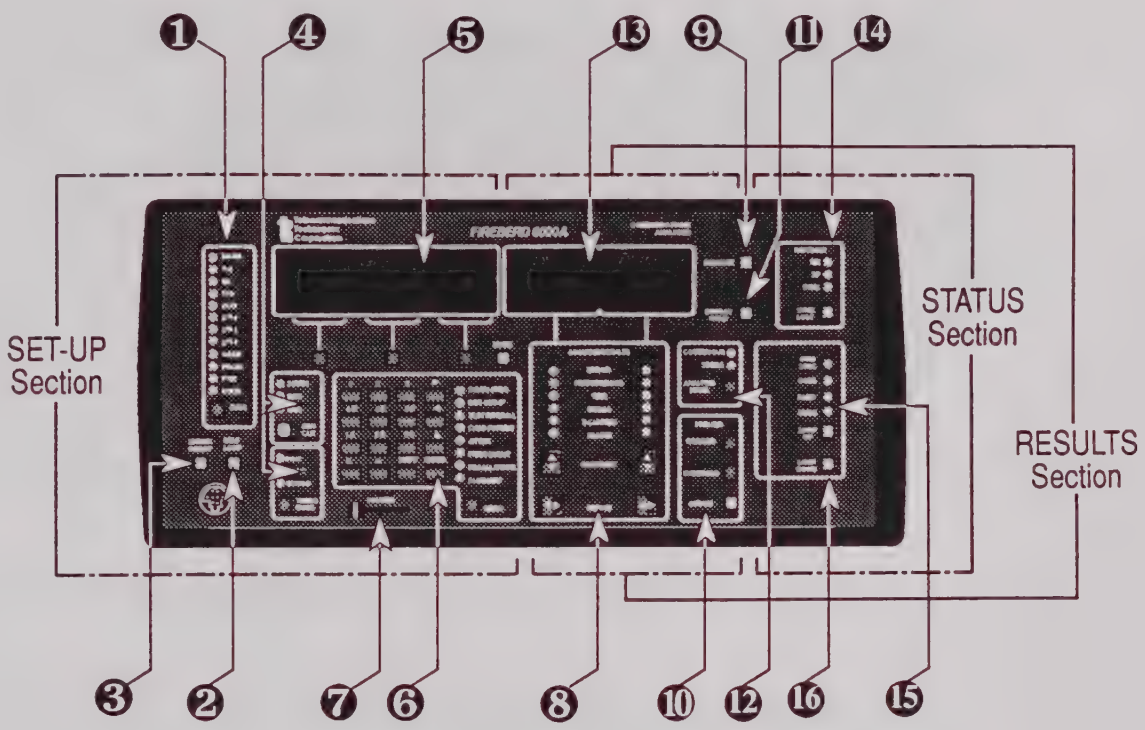
OBJECTIVES FOR THE FIREBERD 6000 MAINFRAME

1. List the three sections of the FIREBERD 6000's front panel.
2. Explain the benefit of four test patterns generated by the FIREBERD 6000.
3. State the frequency range of the FIREBERD 6000.
4. Discuss four FIREBERD 6000 methods use to print out results.
5. Interpret three FIREBERD 6000 Results.
6. Demonstrate the Store/Recall feature of the FIREBERD 6000 by storing and recalling two set-up programs.

FIREBERD 6000 SET-UP



Here is a summary of the functions each section provides:

SET-UP

1) Selection of a test pattern
2) Self loop
3) Error insertion
4) Selection of the transmit and receive timing mode/source
5) Access and display the configuration menus
6) Numeric entry
7) Volume adjustment

RESULTS

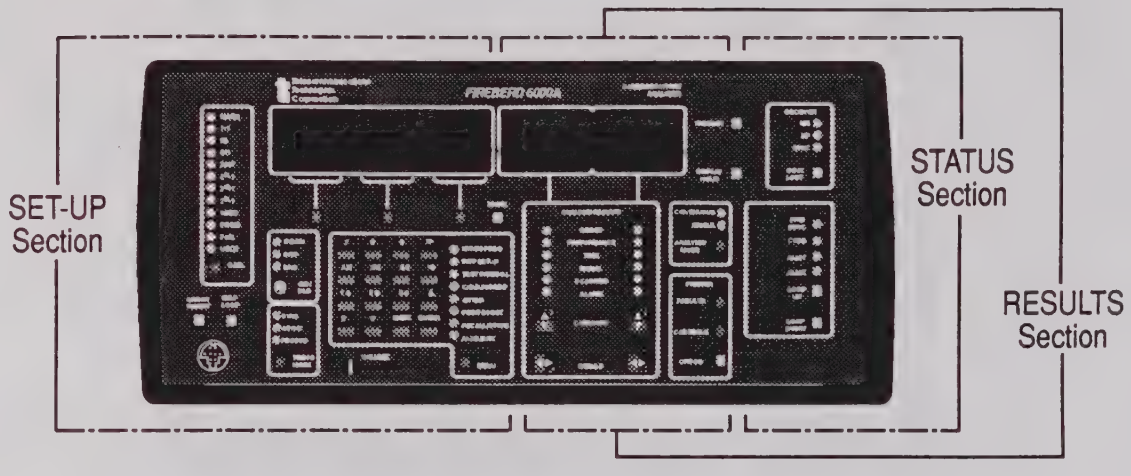
8) Display control for both windows
9) Forced restart
10) Printer management
11) Display freeze
12) Control for "one shot" tests
13) Results Display

STATUS

14) Signal indicators
15) Alarm indicators
16) Looping control

These functions are described in the following pages.

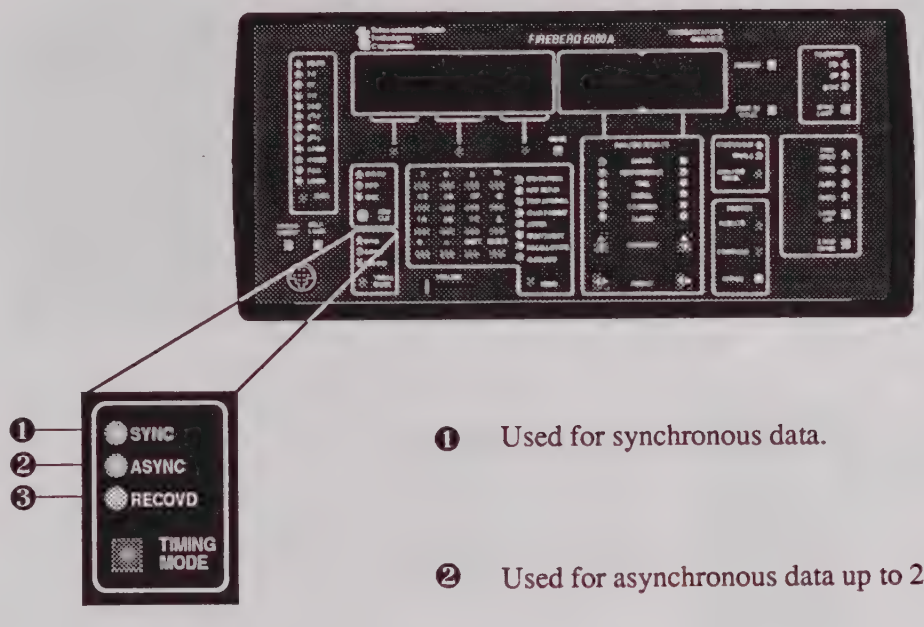
FIREBERD 6000 SET-UP



The front panel of the FIREBERD 6000 is arranged in 3 major sections: *SET-UP, RESULTS, and STATUS.*

- The SET-UP section lets you configure the FIREBERD 6000 for various types of testing. If desired, test configurations can be stored and recalled with the touch of a button.
- The RESULTS section provides real-time and accumulative test results, which can be displayed or printed (using an optional printer).
- The STATUS section provides real-time signal and alarm monitoring.

SELECTING THE TIMING MODE



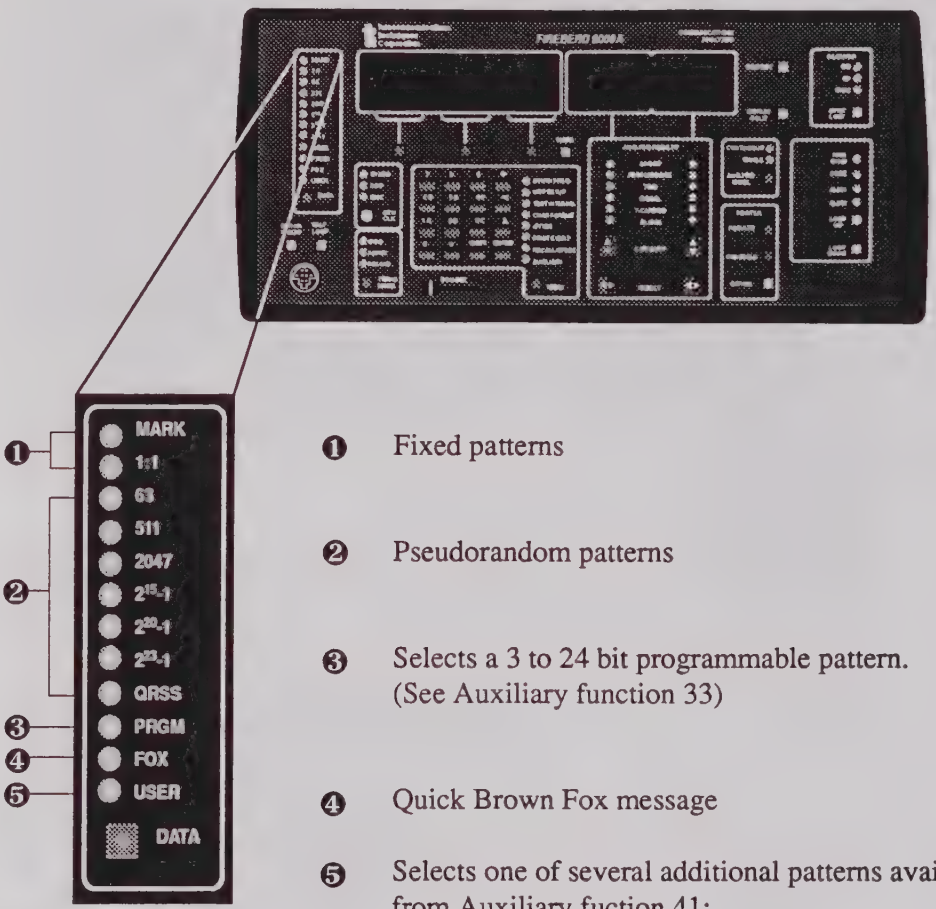
❶ Used for synchronous data.

❷ Used for asynchronous data up to 20 kb/s.

❸ Used with data comm interfaces e.g., RS232, V.35, RS530, etc. to derive the data rate by over-sampling the input signal. Maximum data rate is 520 kb/s. This timing method is only applicable for synchronous timing.

Note: When selecting an interface other than a data comm interface, i.e., DS1 or DDS, the LEDs will not illuminate. Since timing is automatically recovered from the interface module received signal, selecting a timing mode is not required.

SELECTING A DATA TEST PATTERN



❶ Fixed patterns

❷ Pseudorandom patterns

❸ Selects a 3 to 24 bit programmable pattern. (See Auxiliary function 33)

❹ Quick Brown Fox message

❺ Selects one of several additional patterns available from Auxiliary fuction 41:

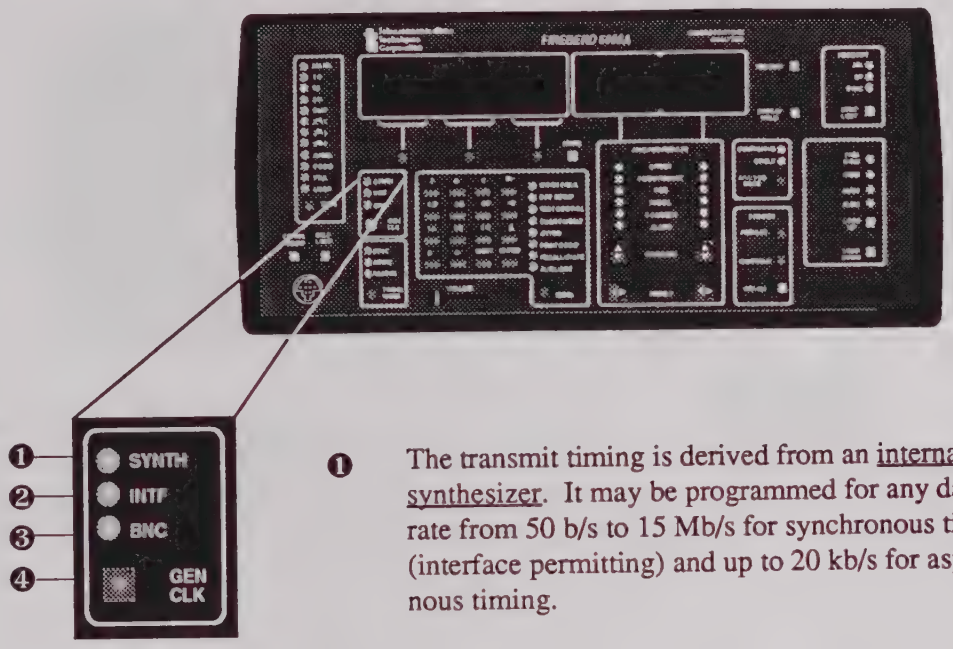
Data Test: ASCII or EBCDIC Fox message

DS1 Test: 1:7, 3 in 24, 1mW, T1-1 - T1-6

DDS Test: 1:7, DDS-1 - DDS-6

Any Test: User programmable message up to 2048 characters long

SELECTING THE SOURCE OF TRANSMIT TIMING



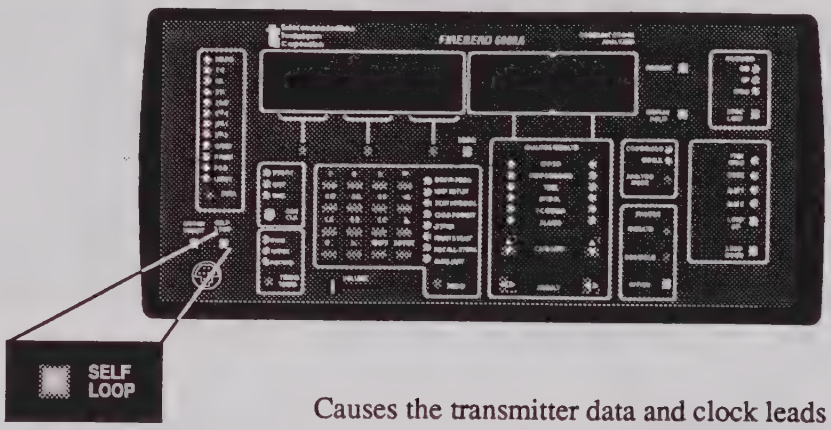
❶ The transmit timing is derived from an internal synthesizer. It may be programmed for any data rate from 50 b/s to 15 Mb/s for synchronous timing (interface permitting) and up to 20 kb/s for asynchronous timing.

❷ The transmit timing is derived from the interface receive signal (e.g., locking onto the bit and byte clock of a DDS signal).

❸ The transmit timing is derived from an external clock via a BNC input on the FIREBERD's rear panel.

❹ Red LED illuminates if an invalid selection is made, or a clock is not available.

SELF LOOP

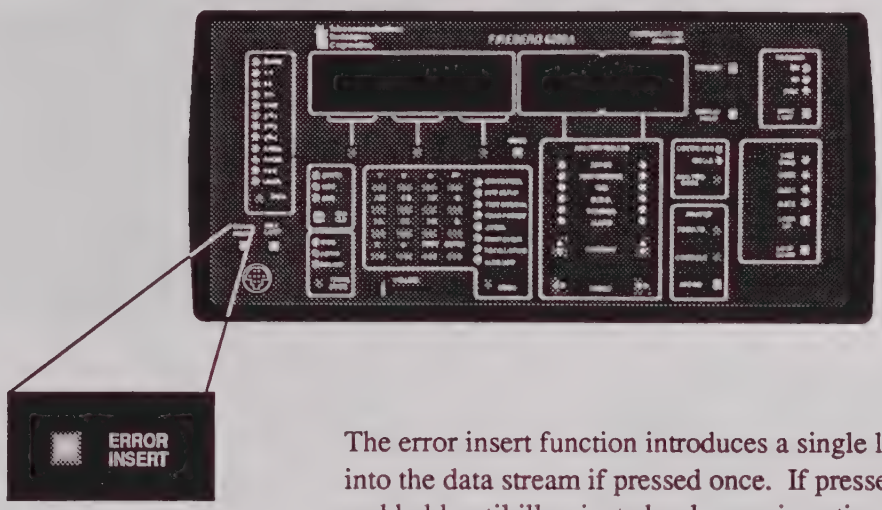


Causes the transmitter data and clock leads to be tied to the receiver data and clock leads. This establishes an internal loop for testing which verifies proper operation of the mainframe and the selected interface.

Allows FIREBERD 6000 set to be disconnected from a circuit under test without physically removing the cables.

Red LED illuminates to signify the FIREBERD is in self loop mode.

INSERTING DATA ERRORS

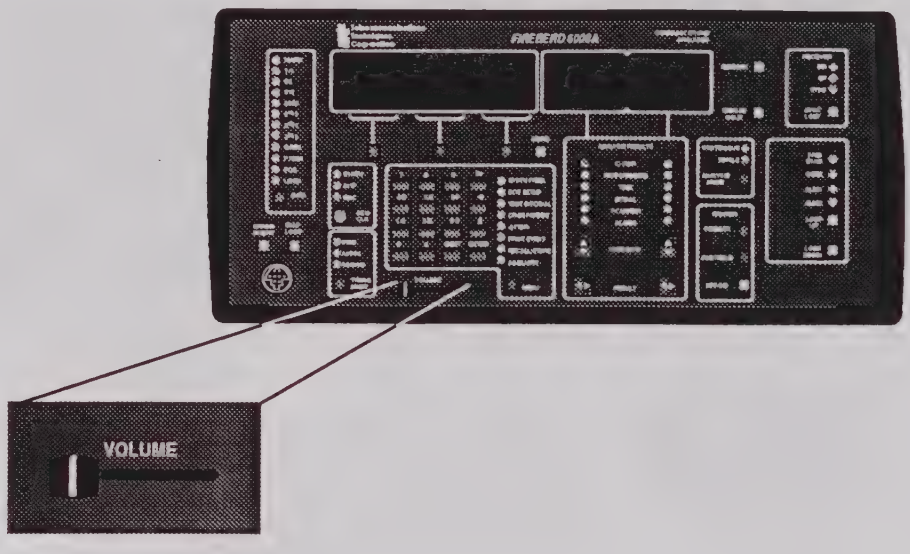


The error insert function introduces a single logic error into the data stream if pressed once. If pressed and held until illuminated red, error insertion occurs at a continuous rate of 1/1000.

ERROR INSERT can be used to check various test configurations.

- SELF LOOP mode: Verifies correct test set configuration by checking that no errors are detected until the ERROR INSERT switch is pressed.
- REMOTE LOOP mode: Checks continuity by inserting single errors and looping them back.
- END-TO-END mode: Verifies that far-end test is synchronized with the test pattern by sending errors from the near-end FIRBERD 6000 and receiving them on the far-end instrument.

ADJUSTING THE VOLUME



The volume control determines the audio level of tones during certain events (e.g., power up and pattern synchronization loss). To increase the volume, move slider switch to the right.

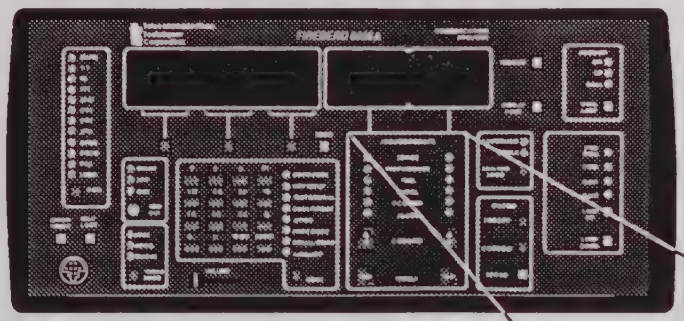
- One Short Beep = Indicates an invalid key entry.

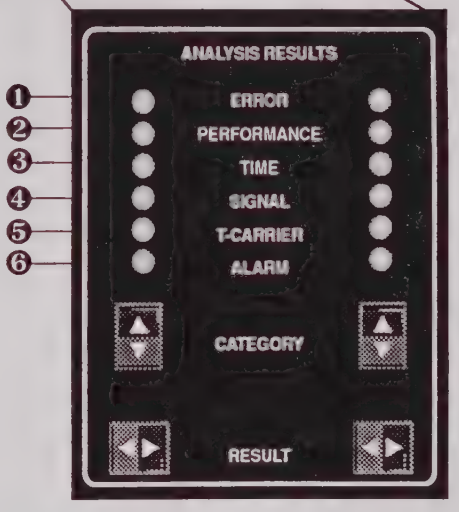
  = Indicates an errored second when either the ERR SEC or BIT ERR result is displayed.

- Two-Tone Beep = Indicates a pattern synchronization loss.

- Three-Tone Beep = Indicates the completion of a test interval when the BER result is displayed.

OBTAINING ANALYSIS RESULTS





Two windows are available to display analysis results. This allows a user to compare and correlate two results via a single glance of the FIREBERD's front panel, (e.g., BIT ERRS and BLK ERRS).

A summary of results is listed below. See the *FIREBERD 6000 Reference Manual* for a complete chart of analysis results.

❶ The ERROR category includes bit errors, bit error rate, block errors, block error rate and pattern slips.

❷ The PERFORMANCE category includes the full set of G.821 specifications.

❸ The TIME category includes elapsed time, BPV seconds, C-bit parity errored seconds.

❹ The SIGNAL category includes delay, jitter, wander, receive frequency and levels and simplex current.

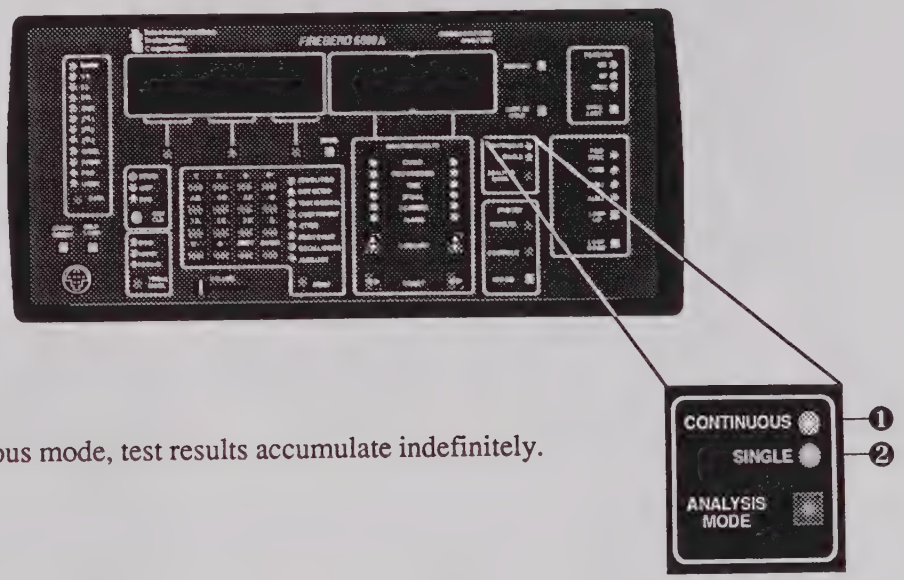
❺ The T-CARRIER category includes BPVs, frame errors, CRC errors and bit slips.

❻ The ALARM category includes power loss, yellow alarm, signal loss.

* Vertical rocker switches select category.

* Horizontal rocker switches select result.

CHOOSING A CONTINUOUS OR TIMED TEST INTERVAL

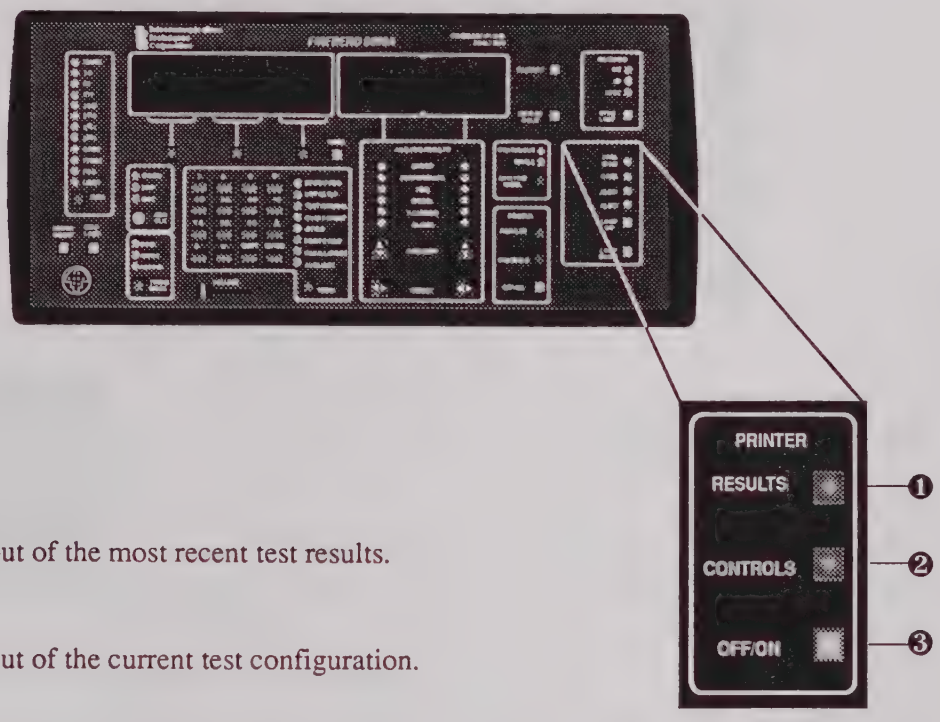


❶ In Continuous mode, test results accumulate indefinitely.

❷ In Single mode, the test ends at a pre-determined time interval or when a specified number of bits are counted. A flashing TEST COMPLETE will appear in the RESULT display at the end of a test.

Note: See TEST INTERVAL under menu function.

OBTAIN A PRINTOUT



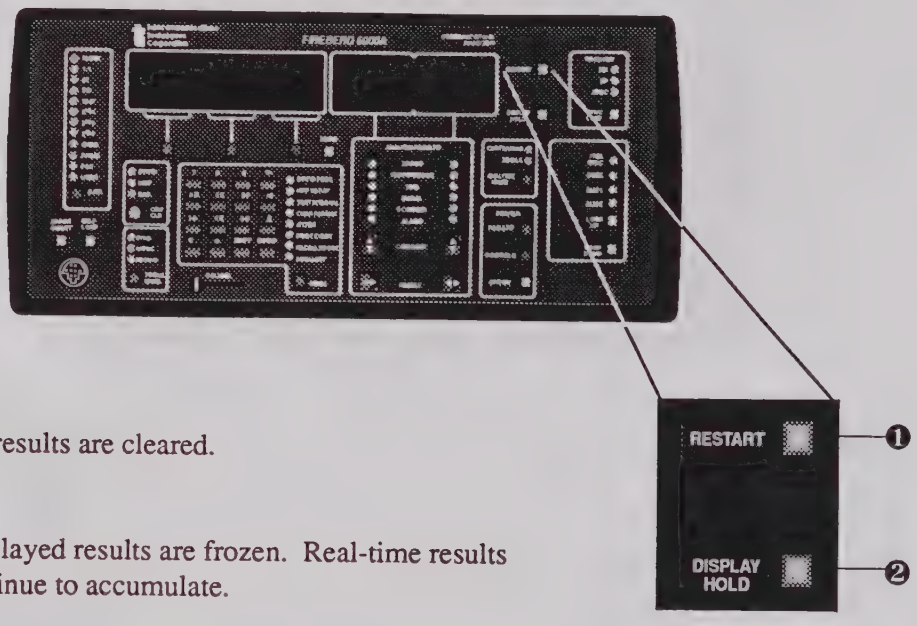
❶ Printout of the most recent test results.

❷ Printout of the current test configuration.

❸ Enables automatic printouts triggered by events (e.g., time interval, errors, time of day, or sync loss). See PRINT EVENT under menu.

Note: If using auxiliary print events, this button must be illuminated.

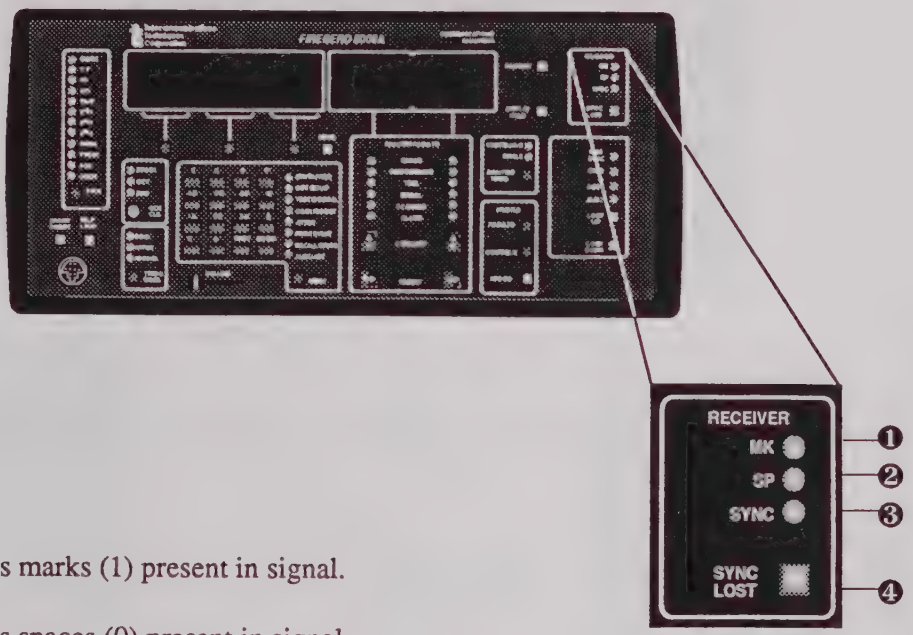
RESTART ANALYSIS RESULTS AND DISPLAY HOLD



❶ All results are cleared.

❷ Displayed results are frozen. Real-time results continue to accumulate.

MONITOR RECEIVED SIGNAL



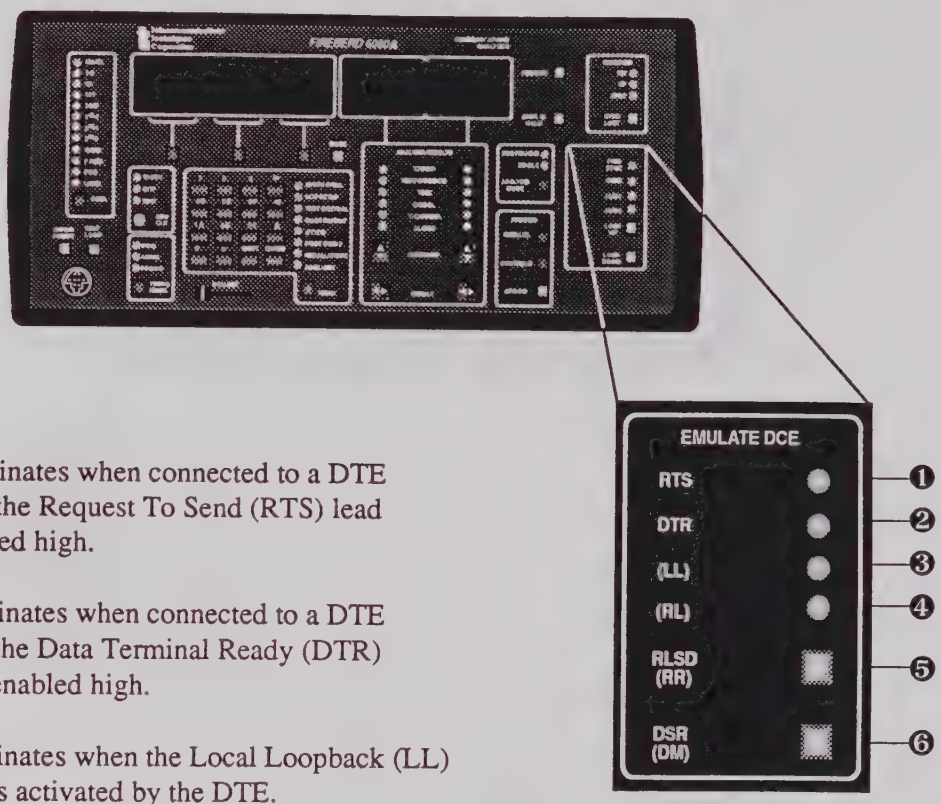
❶ Indicates marks (1) present in signal.

❷ Indicates spaces (0) present in signal.

❸ Indicates *pattern synchronization* during out-of-service testing. Indicates *signal present* during in-service monitoring.

❹ If illuminated red, this indicates either a current sync loss condition or a previous sync loss condition has occurred. (Press to clear.)

SIGNALING FOR DCE EMULATION



❶ Illuminates when connected to a DTE with the Request To Send (RTS) lead enabled high.

❷ Illuminates when connected to a DTE with the Data Terminal Ready (DTR) lead enabled high.

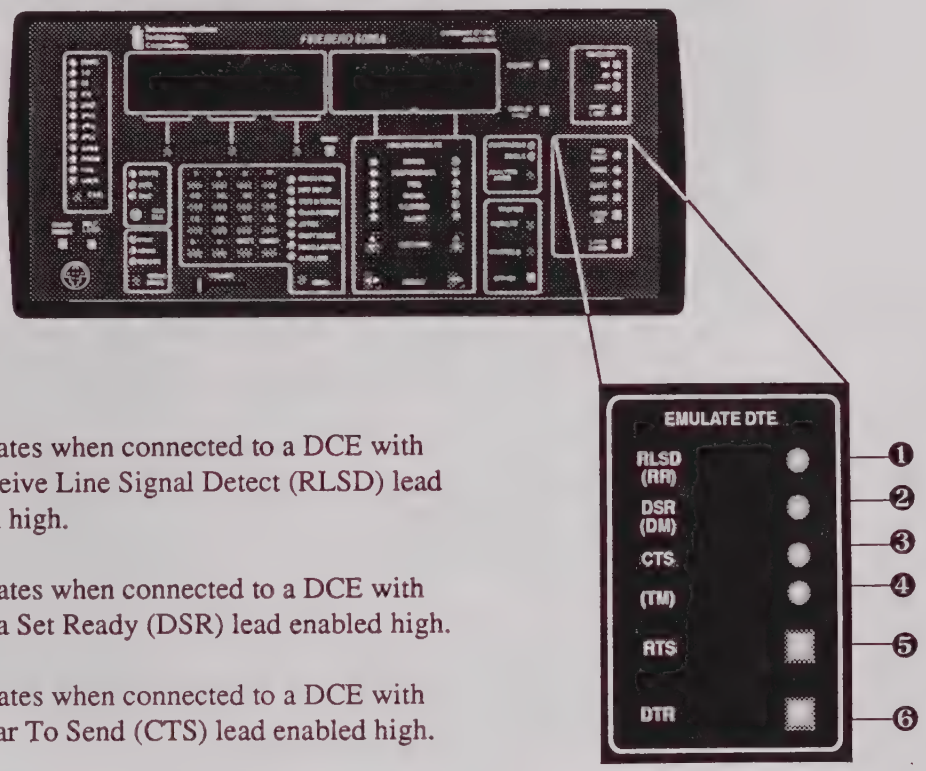
❸ Illuminates when the Local Loopback (LL) lead is activated by the DTE.

❹ Illuminates when the Remote Loopback (RL) lead is activated by the DTE.

❺ This switch controls the status of the Receive Line Signal Detect (RLSD) line. Illuminates in the ON position.
Note: (RR) is RS-449 specific.

❻ This switch controls the status of the Data Set Ready (DSR) line. Illuminates in the ON position.
Note: (DM) is RS-449 specific.

SIGNALING FOR DTE EMULATION



❶ Illuminates when connected to a DCE with the Receive Line Signal Detect (RLSD) lead enabled high.

❷ Illuminates when connected to a DCE with the Data Set Ready (DSR) lead enabled high.

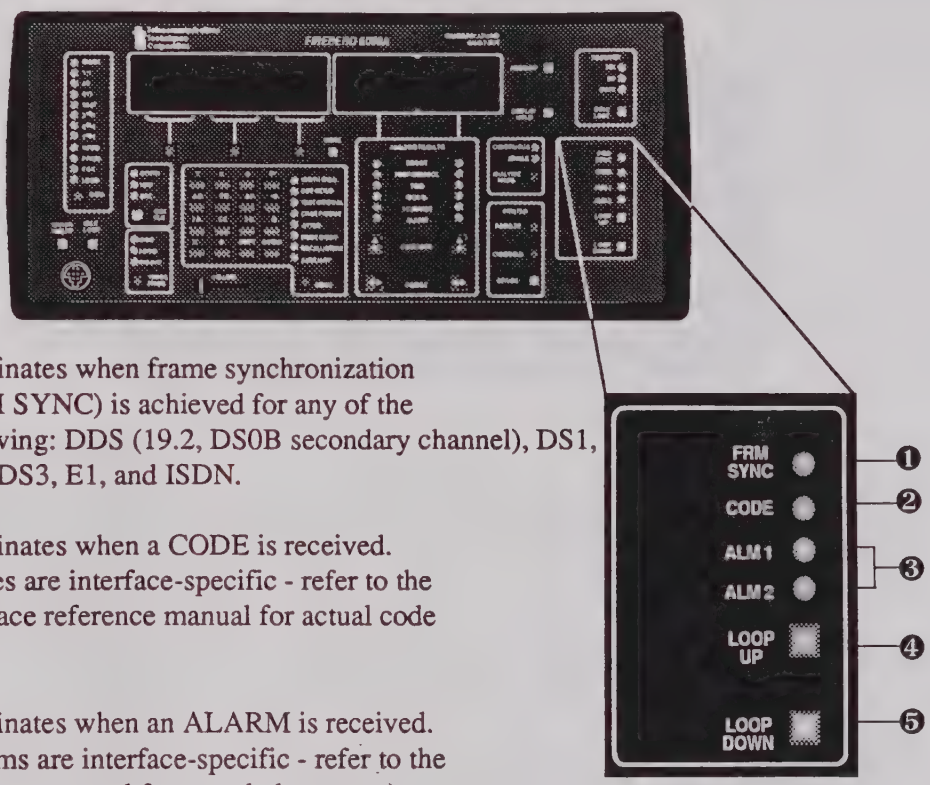
❸ Illuminates when connected to a DCE with the Clear To Send (CTS) lead enabled high.

❹ Illuminates when the Test Mode (TM) lead is activated by the DCE.

❺ This switch controls the status of the Request To Send (RTS) line. Illuminates in the ON position.

❻ This switch controls the status of the Data Terminal Ready (DTR) line. Illuminates in the ON position.

SIGNAL STATUS AND LOOP CONTROL



❶ Illuminates when frame synchronization (FRM SYNC) is achieved for any of the following: DDS (19.2, DS0B secondary channel), DS1, FT1, DS3, E1, and ISDN.

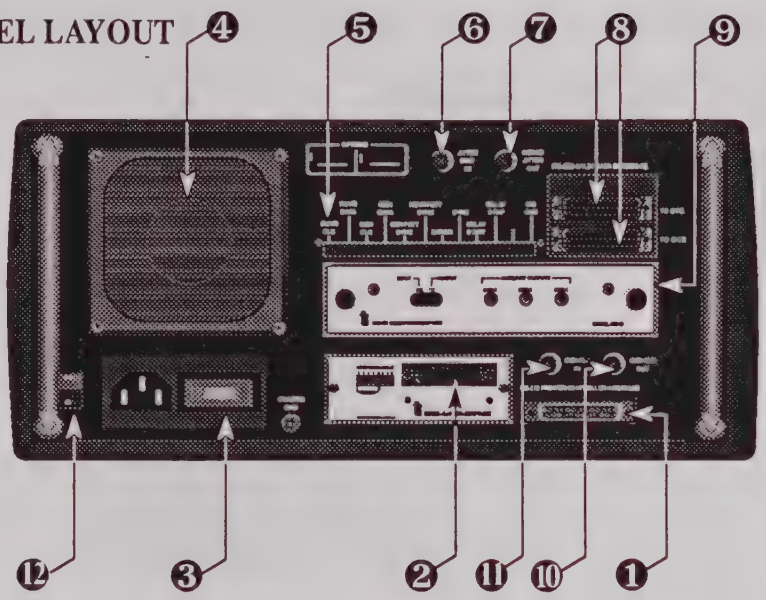
❷ Illuminates when a CODE is received. (Codes are interface-specific - refer to the interface reference manual for actual code type).

❸ Illuminates when an ALARM is received. (Alarms are interface-specific - refer to the interface manual for actual alarm type).

❹ This switch is used for sending loop-up codes. During DS1 testing, the FIREBERD RESULT Display flashes TRANSMITTING LOOP CODE when sending code and then stops flashing once the loop-up is complete. Refer to the interface reference manual for displayed messages on all interfaces with loop-up capability.

❺ This switch used for sending loop-down codes. For DS1 testing, the FIREBERD RESULT Display flashes TRANSMITTING LOOP CODE when sending code and then stops flashing once the loop-down is complete. Refer to the interface reference manual for displayed messages on all interfaces with loop-down capability.

REAR PANEL LAYOUT



1) RS-232 PRINTER/CONTROLLER INTERFACE

2) IEEE-488 INTERFACE SLOT

3) FUSE AND VOLTAGE SELECTOR - 115 or 230 volts AC

4) FAN

5) TEST POINTS - For synchronization and measurement purposes.

RCVR CLK	ERROR
RCVR DATA	SYNC
GEN CLK	DELAY START
GEN DATA	DELAY STOP
GEN PATT SYNC	Z
RCVR PATT SYNC	SIG GND

(See reference manual for specific description and application.)

6) JITTER MOD IN - Accepts an external signal to jitter the transmitted T1 or E1 signal.

7) DEMOD JITTER OUT - Jitter is extracted from the transmitted signal and sent to this output.

8) RS-232C/V.24 DATA INTERFACE DTE/DCE CONNECTORS - Connects to DCE or DTE.

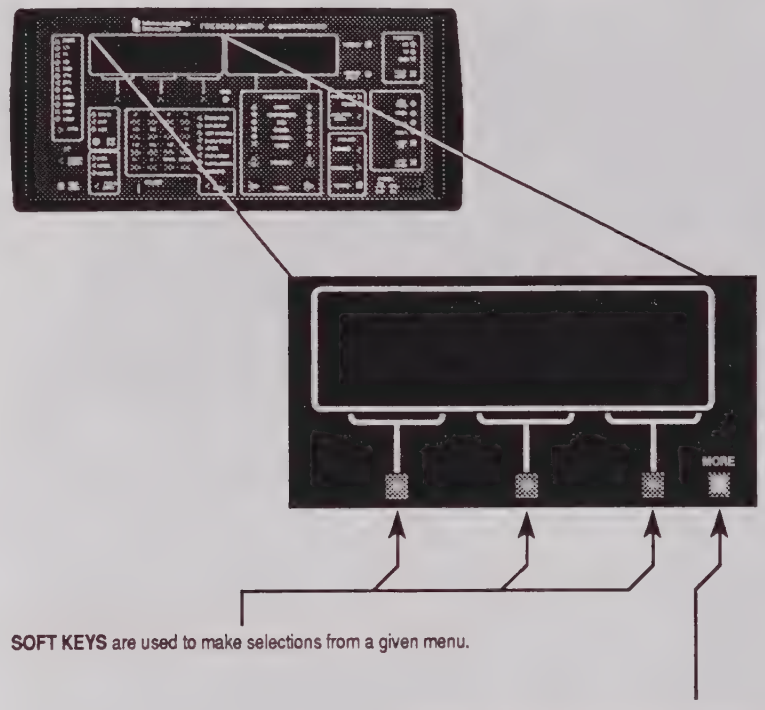
9) DATA INTERFACE SLOT - Accepts FIREBERD modular interfaces.

10) GEN CLK OUT - TTL level version of the generator clock.

11) GEN CLK IN - Allows external clock source to drive the transmit timing.

12) POWER - Used to power the FIREBERD on or off.

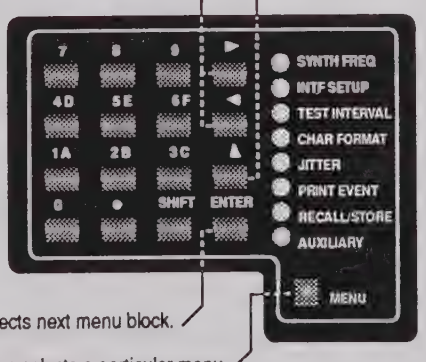
USING THE MENU KEYPAD AND SOFT KEYS



SOFT KEYS are used to make selections from a given menu.

The **MORE** button lights if more than three selections are available. These Additional selections will be displayed when this button is pressed.

ALPHA NUMERIC KEYPAD - used for data entry within the menu structure.



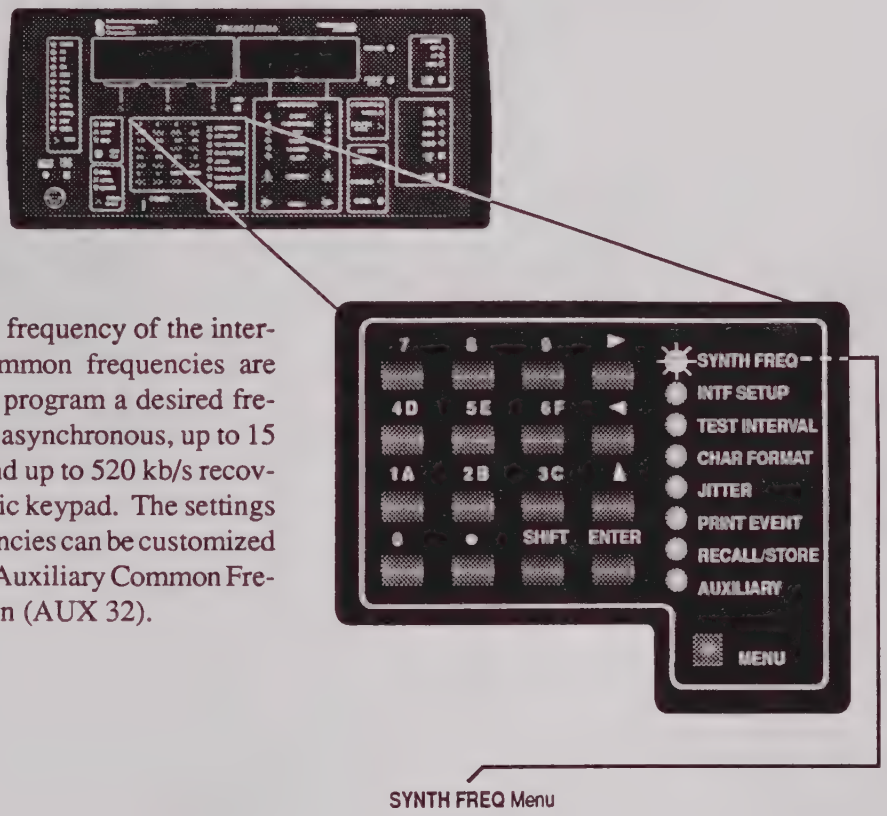
LEFT and RIGHT **ARROWS** move the cursor when entering data.

UPWARD **ARROW** selects previous menu block.

ENTER enters the data and selects next menu block.

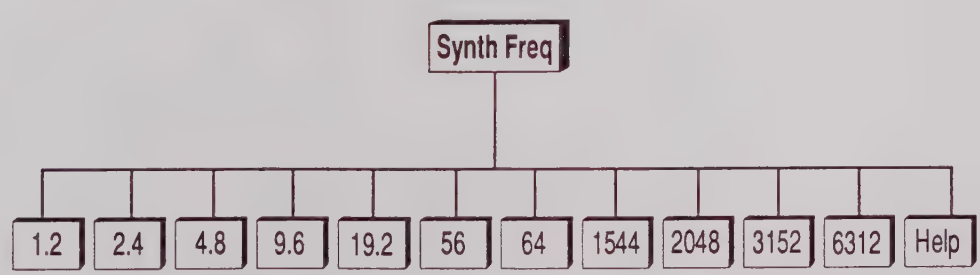
MENU button selects a particular menu.

SYNTH FREQ MENU



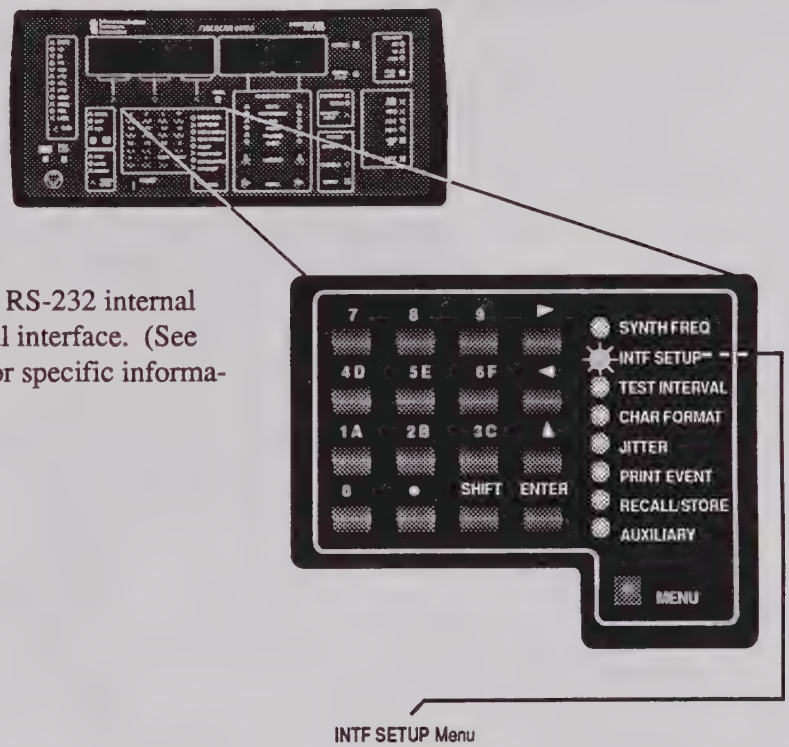
SYNTH FREQ Menu

This menu selects the frequency of the internal synthesizer. Common frequencies are available, or you can program a desired frequency (up to 20 kb/s asynchronous, up to 15 Mb/s synchronous, and up to 520 kb/s recovered) using the numeric keypad. The settings of the common frequencies can be customized via the FIREBERD's Auxiliary Common Frequency menu selection (AUX 32).

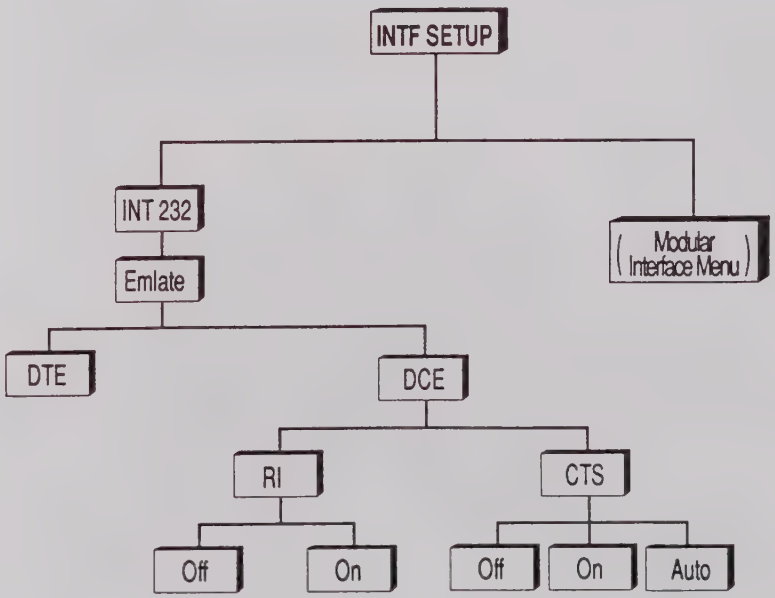


INTF SETUP MENU

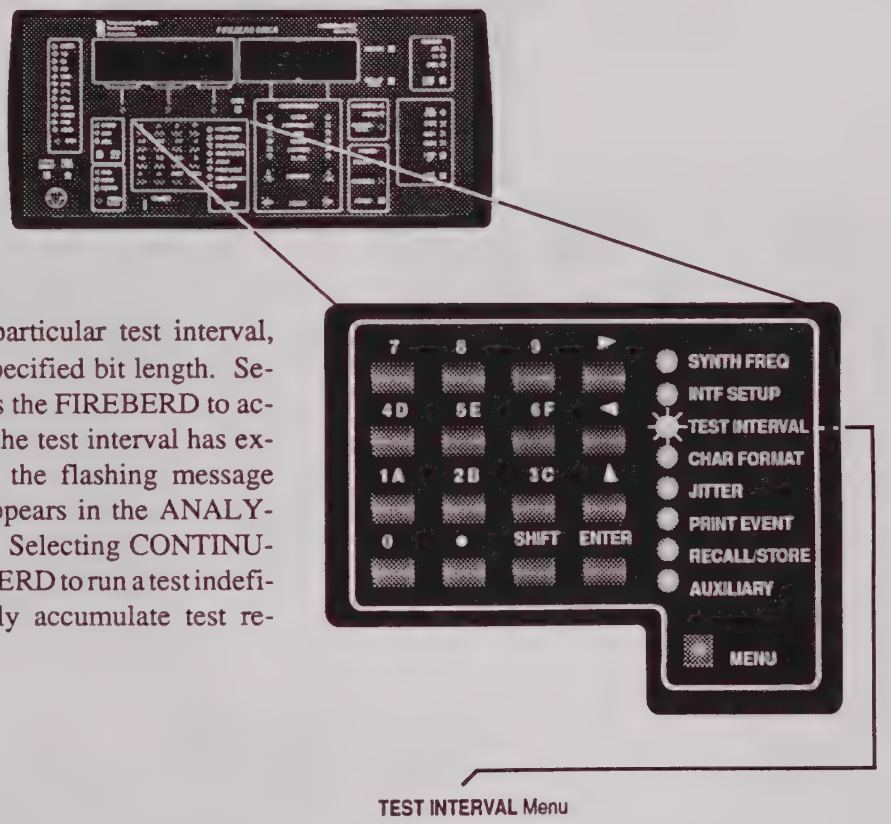
This menu selects the internal RS-232 internal interface or a modular external interface. (See interface reference manuals for specific information on an interface.)



INTF SETUP Menu

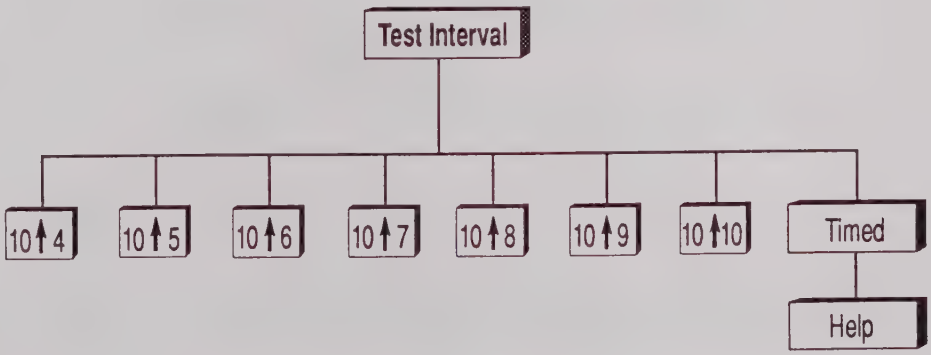


TEST INTERVAL MENU

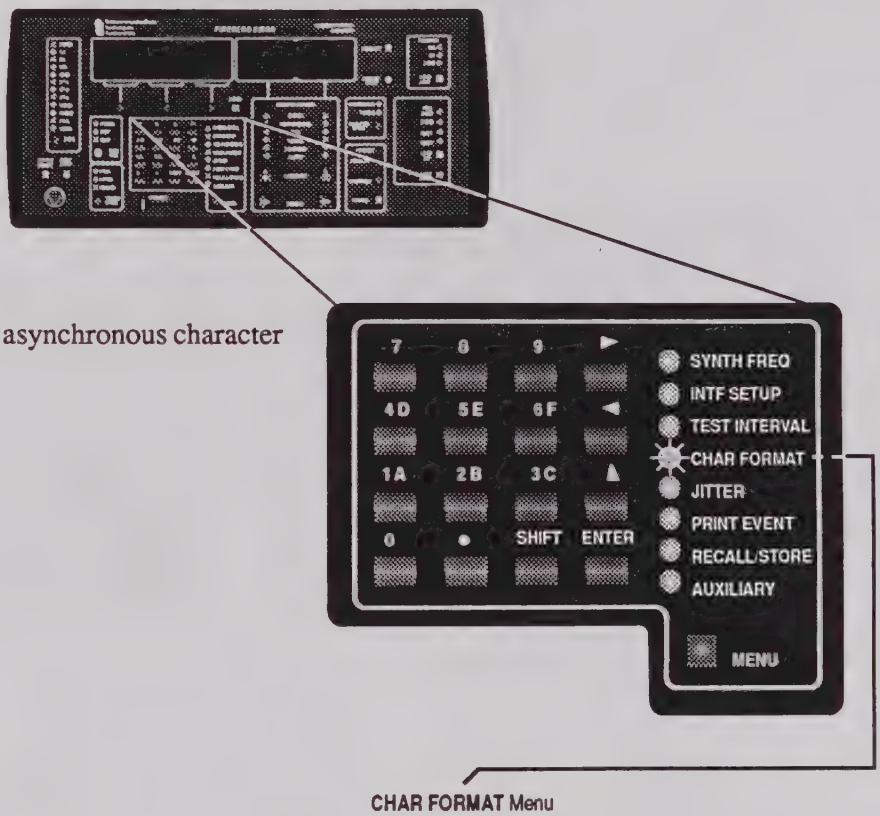


TEST INTERVAL Menu

This menu selects a particular test interval, either timed or for a specified bit length. Selecting SINGLE causes the FIREBERD to accumulate results until the test interval has expired. At such time, the flashing message TEST COMPLETE appears in the ANALYSIS RESULT display. Selecting CONTINUOUS causes the FIREBERD to run a test indefinitely and continuously accumulate test results.

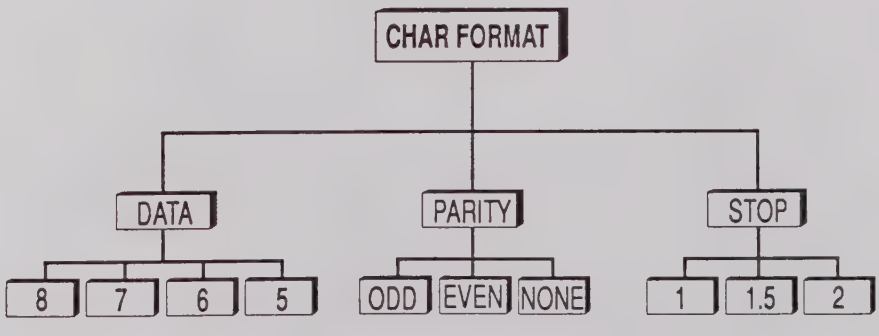


CHAR FORMAT MENU

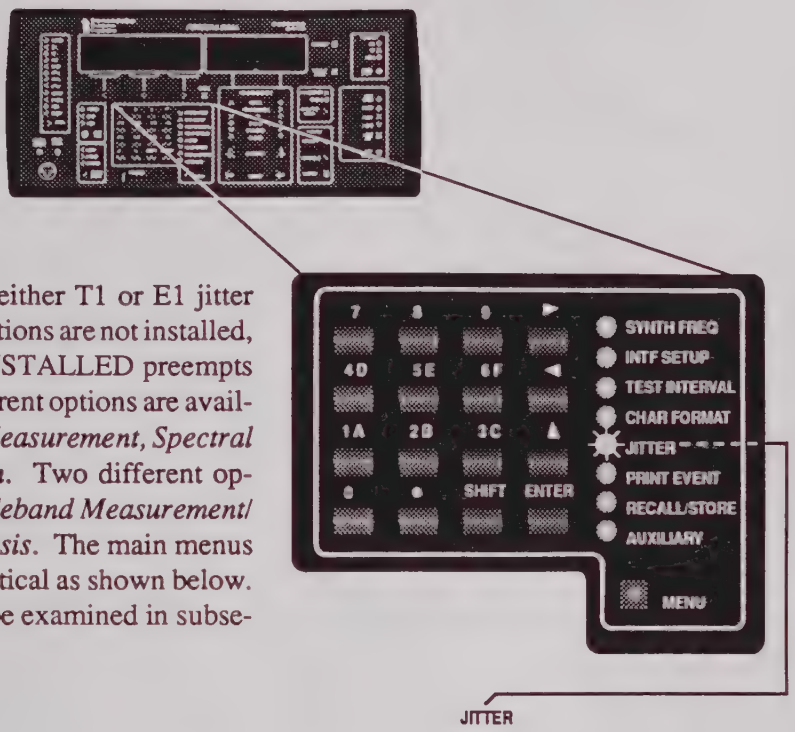


CHAR FORMAT Menu

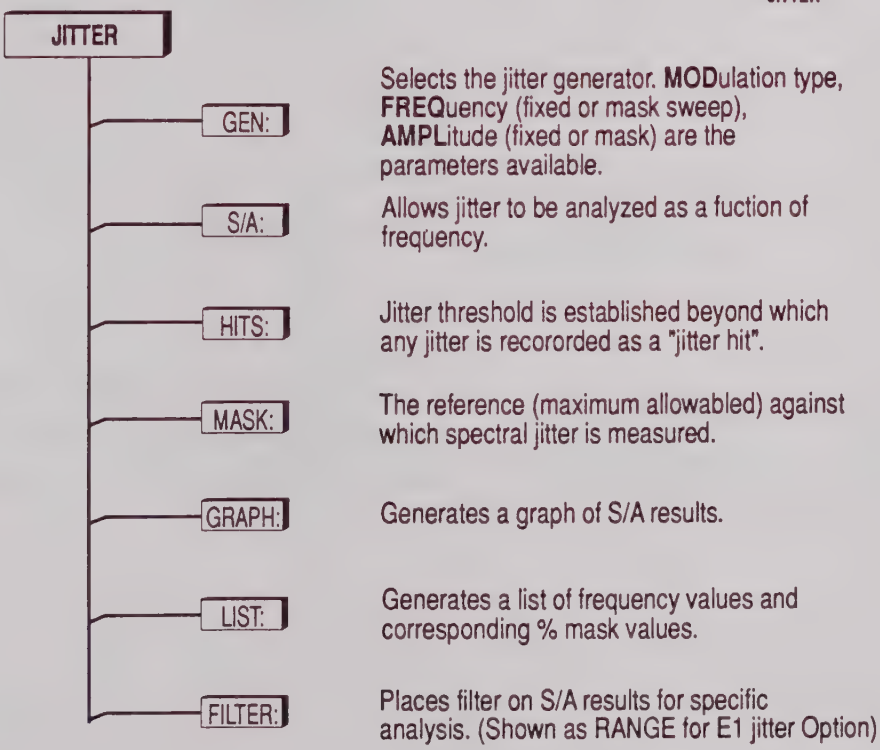
This menu selects the asynchronous character format.



JITTER MENU



This menu is displayed when either T1 or E1 jitter options are installed. If jitter options are not installed, the message OPTION NOT INSTALLED preempts the menu selection. Three different options are available for T1: *Wideband Jitter Measurement, Spectral Analysis and Jitter Generation.* Two different options are available for E1: *Wideband Measurement/ Generation and Spectral Analysis.* The main menus for T1 and E1 are virtually identical as shown below. Submenus for T1 and E1 will be examined in subsequent pages.



Selects the jitter generator. **MOD**ulation type, **FREQ**uency (fixed or mask sweep), **AMPL**itude (fixed or mask) are the parameters available.

Allows jitter to be analyzed as a fuction of frequency.

Jitter threshold is established beyond which any jitter is recororded as a "jitter hit".

The reference (maximum allowabled) against which spectral jitter is measured.

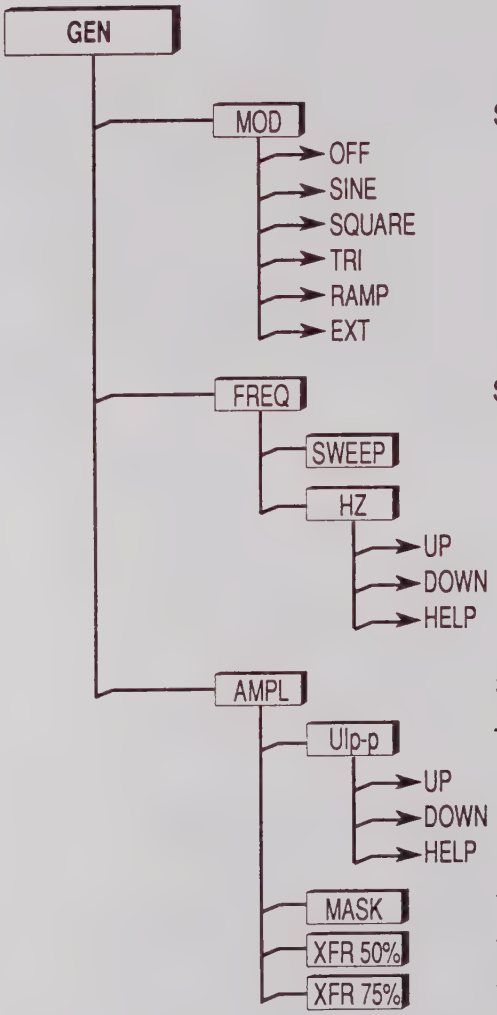
Generates a graph of S/A results.

Generates a list of frequency values and corresponding % mask values.

Places filter on S/A results for specific analysis. (Shown as RANGE for E1 jitter Option)

T1 JITTER MENU

GENerator Sub Menu - Jitter Generator Feature



Selects the modulation waveform type.

Selects a fixed or sweep frequency.

Selects amplitude level.

The amplitude level is fixed.

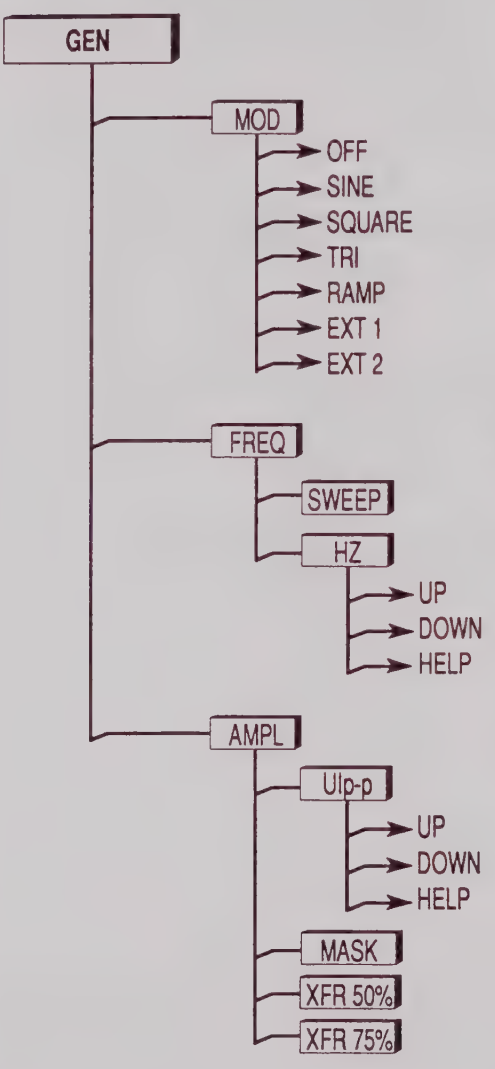
The amplitude level follows the selected mask.

The amplitude level follow 50% of the selected mask.

The amplitude level follows 75% of the selected mask.

E1 JITTER MENU

GENerator Sub Menu - Jitter Generator Feature



Selects the modulation waveform type.

Selects a fixed or sweep frequency.

Selects the amplitude level.

The amplitude level is fixed.

The amplitude level follows the selected mask.

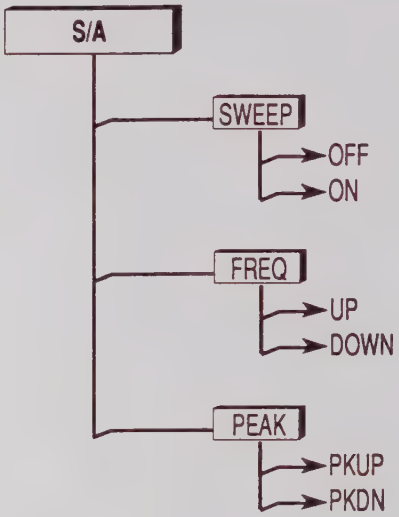
The amplitude level follows 50% of the selected mask.

The amplitude level follows 75% of the selected mask.

T1 JITTER MENU

S/A Sub Menu - Spectral Analysis Feature

Allows the FIREBERD 6000 to sweep the frequency spectrum and provide graphic or tabular results for a series of frequency steps.



Activates the frequency sweep.

Allows selection of a fixed frequency and gives its U/I value when S/A sweep is turned off.

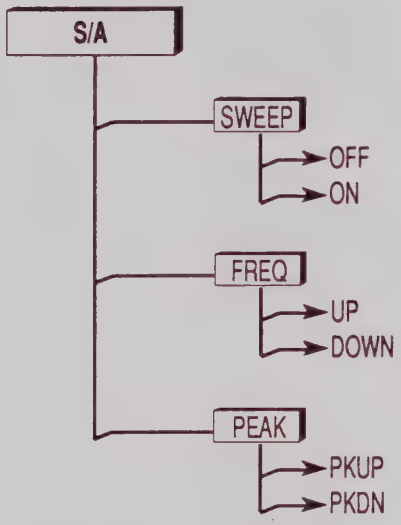
Identifies the maximum U/I value for each frequency when S/A sweep is turned on.

Locates the frequencies of excessive jitter. Only available when S/A sweep is turned on.

E1 JITTER MENU

S/A Sub menu - Spectral Analysis feature.

Allows the FIREBERD 6000 to sweep the frequency spectrum and provide graphic or tabular results for a series of frequency steps.



Activates the frequency sweep.

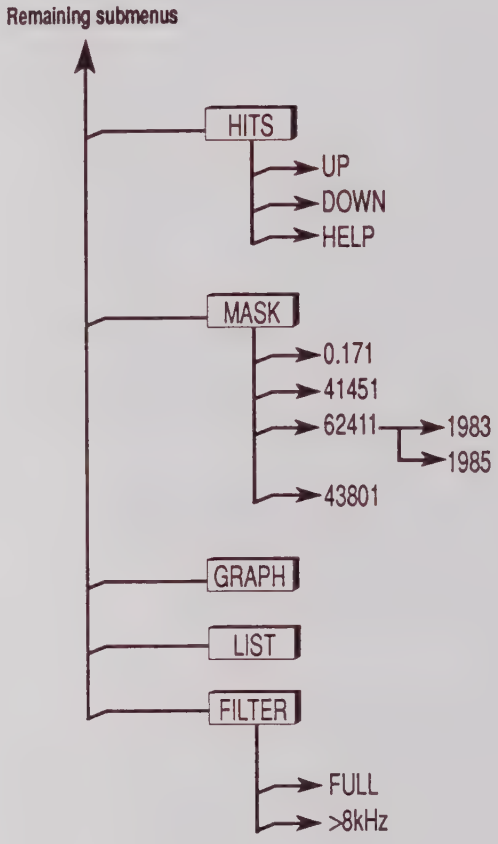
Allows selection of a fixed frequency and gives its U/I value when S/A sweep is turned off.

Identifies the maximun U/I value for each frequency when S/A sweep is turned on.

Locates the frequencies of excessives jitter. Only available when S/A sweep is turned on.

T1 JITTER MENU

Remaining jitter sub menus:



Selects the jitter threshold.

Selects the reference mask.

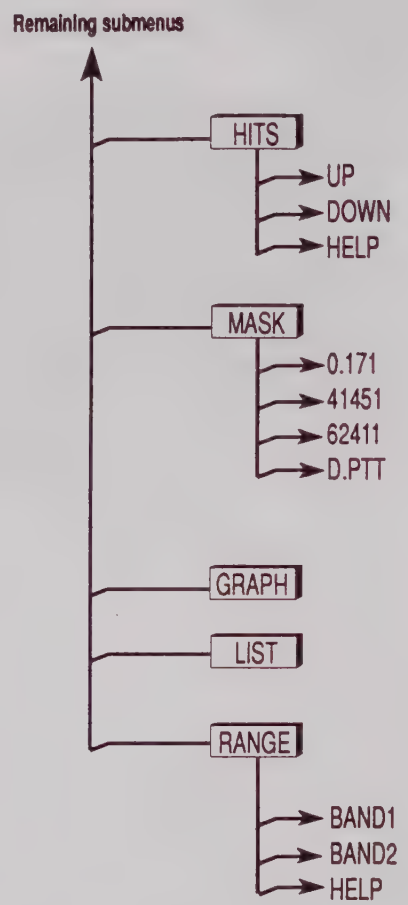
Selection prints a jitter graph.

Selection prints a list of jitter values. This includes % mask and a U/I value for each of the 40 discrete frequencies.

Selects the highpass filter.

E1 JITTER MENU

Remaining jitter sub menus:



Selects the jitter threshold.

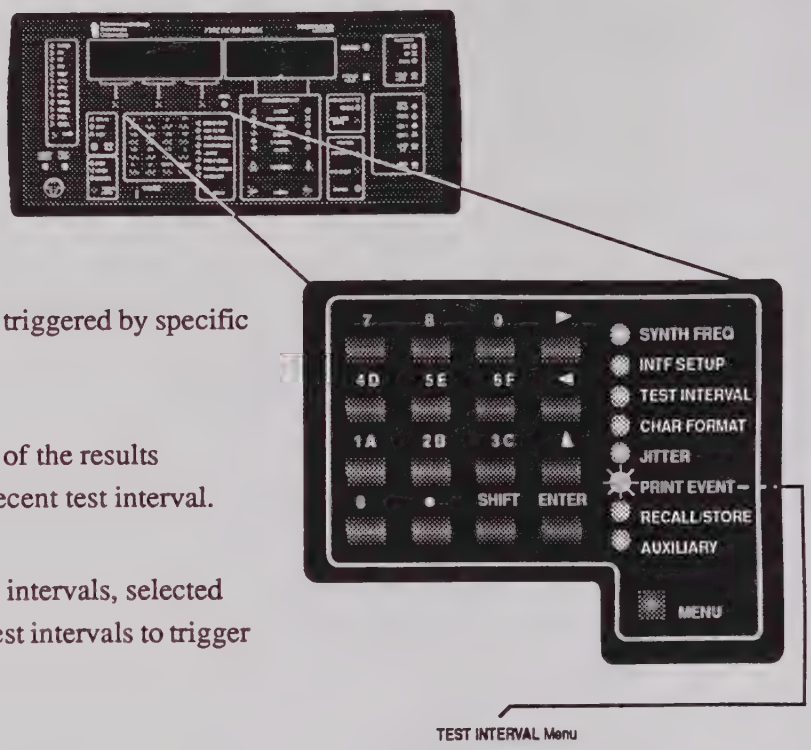
Selects the reference mask.

Selection Prints a Jitter graph.

Selection prints a list of jitter values. This includes % mask and a U/I value of the 58 discrete frequencies.

Selects the bandwidth limit.

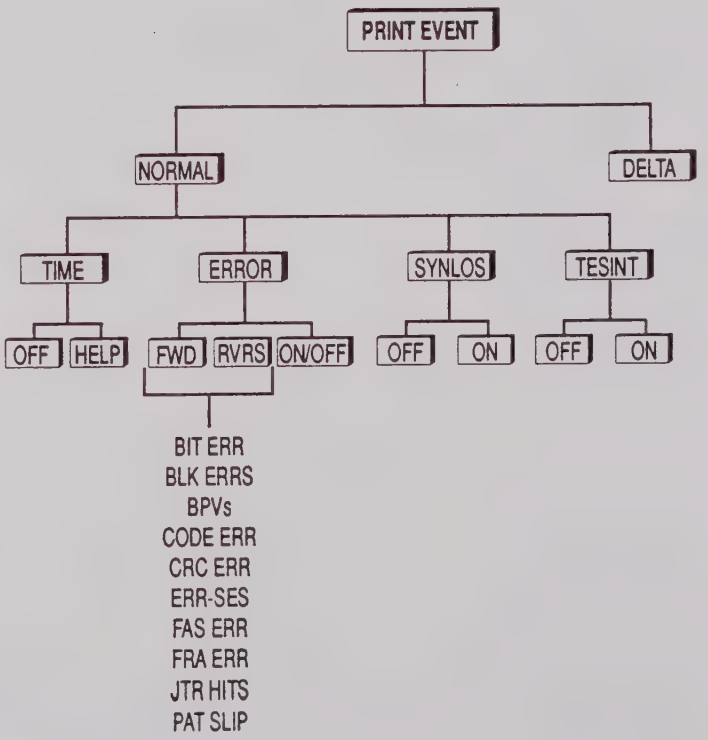
PRINT EVENT MENU



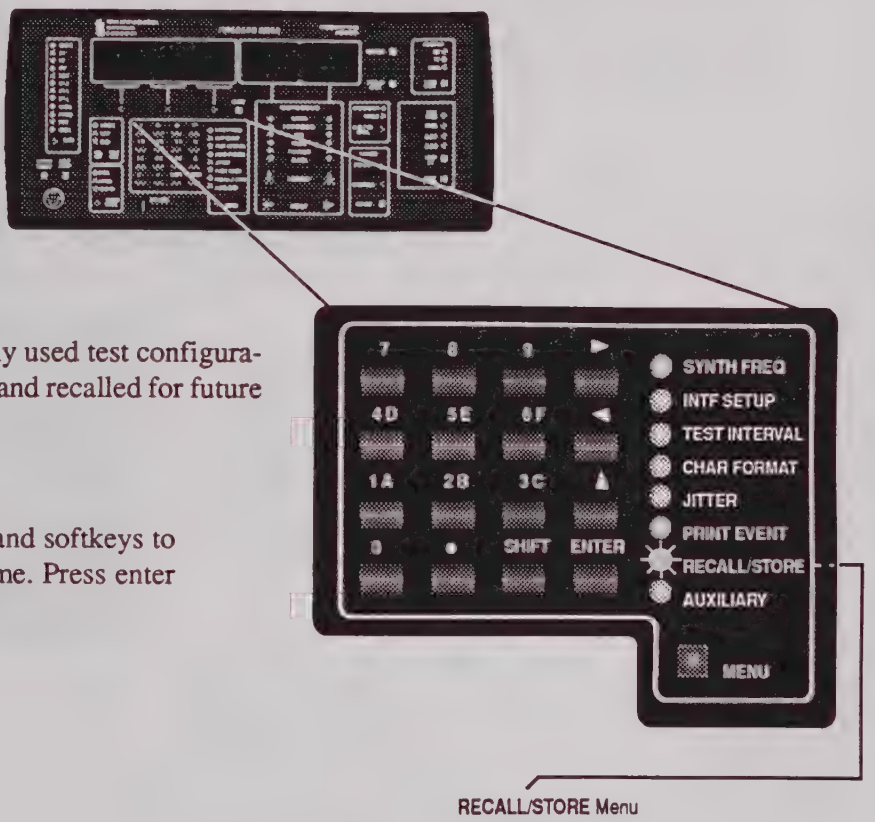
Allows printout of results to be triggered by specific events.

A DELTA print is a hard copy of the results accumulated during the most recent test interval.

A NORMAL print allows time intervals, selected types of errors, sync loss, and test intervals to trigger prints.

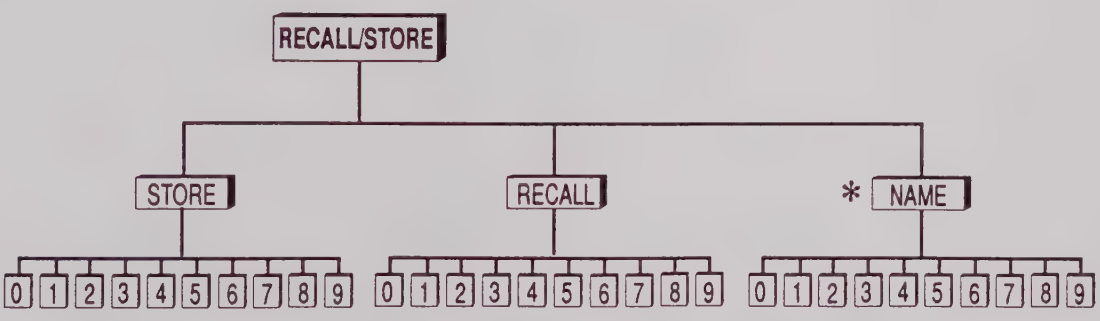


RECALL/STORE MENU

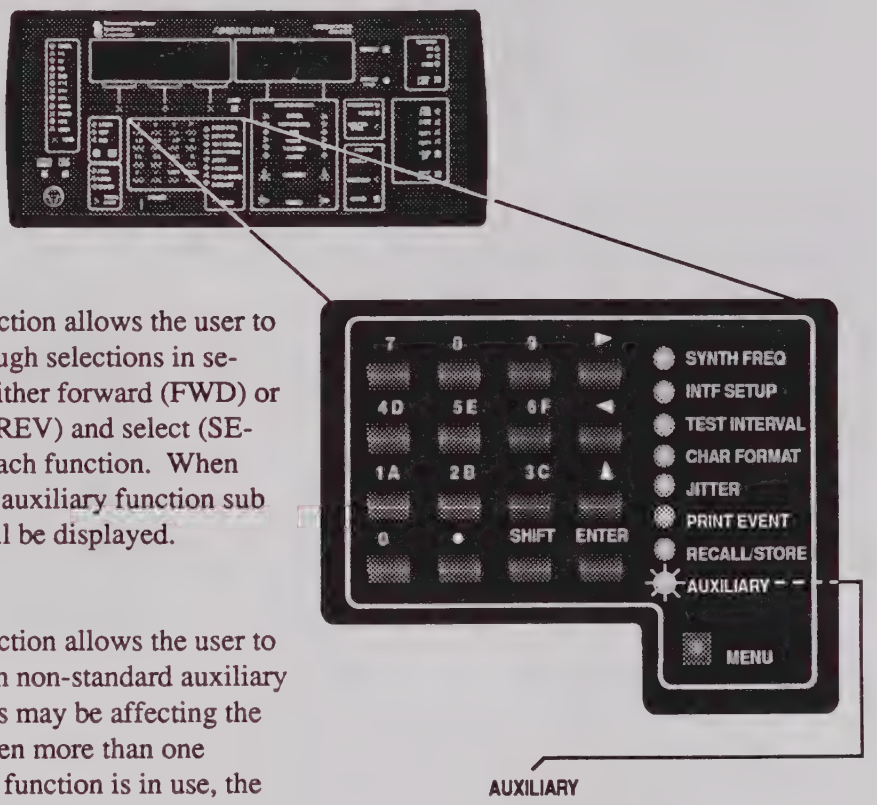


Allows up to 10 frequently used test configurations to be stored, named and recalled for future use.

* Use the cursor keys and softkeys to enter a four-digit name. Press enter to save the name.

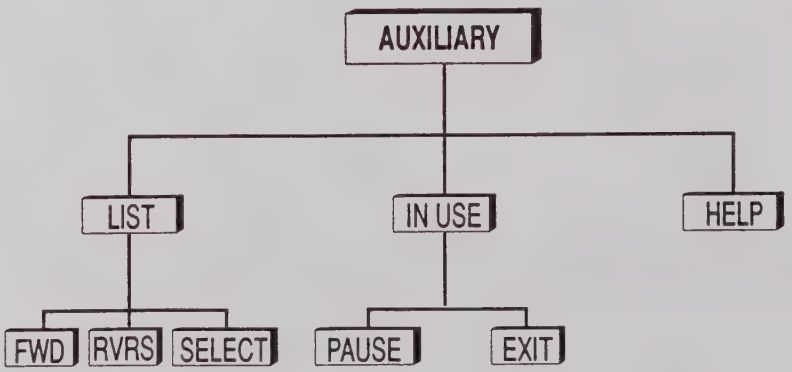


AUXILIARY MENU



LIST: This selection allows the user to step through selections in sequence either forward (FWD) or reverse (REV) and select (SELECT) each function. When selected, auxiliary function sub menu will be displayed.

IN USE: This selection allows the user to see which non-standard auxiliary selections may be affecting the test. When more than one auxiliary function is in use, the FIREBERD displays all of the functions affected via a scrolling process.

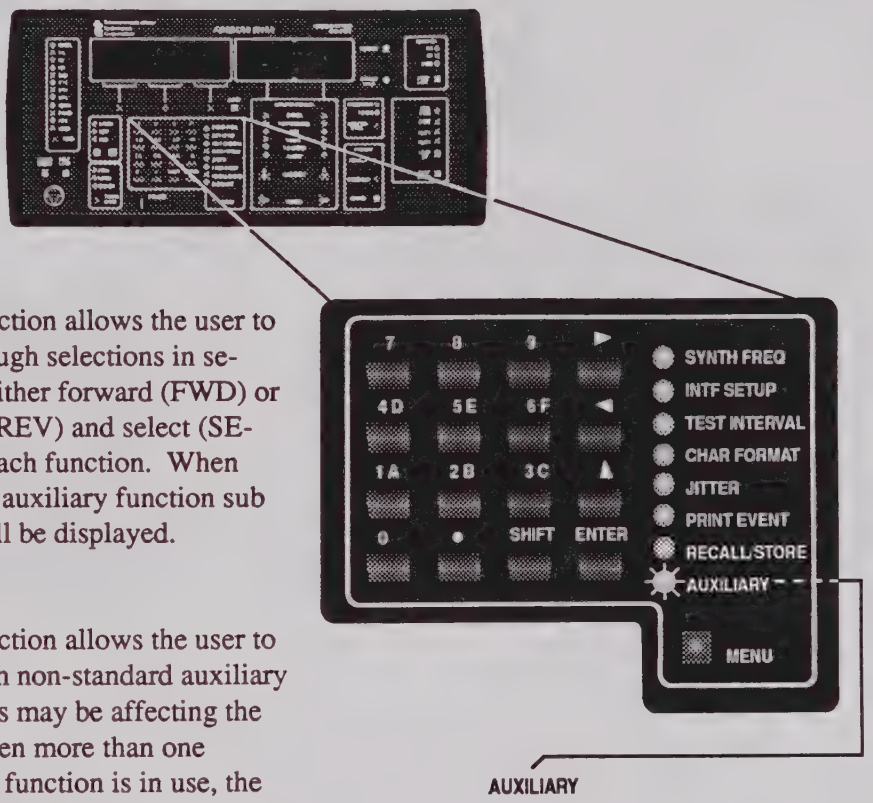


SUMMARY OF AUXILIARY FUNCTIONS

For a more in depth explanation of each auxiliary function, see the *FIREBERD 6000 Reference Manual.*

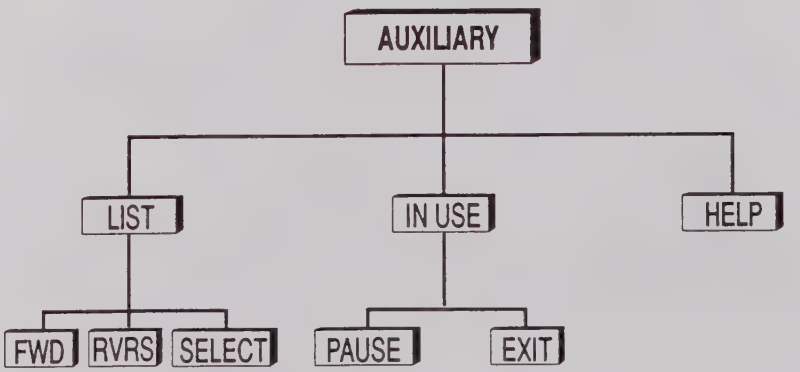
1	Generator Clock Polarity:	Selects clock data phasing generated.
2	Receiver Clock Polarity:	Selects clock data phasing received.
3	Receiver Action on Sync Loss:	Allows receiver to Halt, Freeze, or Clear on pattern synchronization loss.
4	Single Transmit:	Allows a single pattern/message to be transmitted once.
6	Generator Data Inversion:	Allows transmitted data to be inverted.
7	Receiver Clock Selection:	Allows received data to be inverted.
8	Out-of-Band Flow Control:	Selects whether signaling leads affect data transmission
9	In-band flow control:	Allows FIREBERD 6000 to respond to XON and XOFF characters.
10	Synchronization Loss Threshold:	Selects threshold of bit errors for pattern synchronization loss.
11	I/O Driver Selection:	Selects I/O port for printing or remote control.
30	Block Length:	Selects block length from 100 to 1,000,000 bits.
31	Delay:	Allows signal delay timing.
32	Programmed Synthesizer Frequencies:	Allows custom programmed frequencies.
33	Programmed Patterns:	Allows a 3 to 24 bit pattern to be programmed.

AUXILIARY MENU



LIST: This selection allows the user to step through selections in sequence either forward (FWD) or reverse (REV) and select (SELECT) each function. When selected, auxiliary function sub menu will be displayed.

IN USE: This selection allows the user to see which non-standard auxiliary selections may be affecting the test. When more than one auxiliary function is in use, the FIREBERD displays all of the functions affected via a scrolling process.



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31	Delay:	Allows signal delay timing.
32	Programmed Synthesizer Frequencies:	Allows custom programmed frequencies.
33	Programmed Patterns:	Allows a 3 to 24 bit pattern to be programmed.

SUMMARY OF AUXILIARY FUNCTIONS (cont.)

34	Site Identification:	Allows a stored configuration to have a custom name.
35	Results Print Content:	Selects format of printout of results.
36	Status Print Selection:	Selects a printout to occur with every status change.
37	Printout Format:	Specifies the printout format.
38	RS-232 Printout/Control Setup:	Configures RS-232 Printer/Controller interface.
39	IEEE-488 Print/Control Setup:	Allows current address of IEEE-488 interface to be viewed.
40	Software Version Display:	Displays current version of software.
41	User Message Selection:	Allows for programming of custom messages.
42	Pre-sync Loss Results:	Allows pre-pattern synchronization loss results to be recalled.
43	Clear Non-volatile Memory:	Returns all settings to default values.
44	Histogram Set-up:	Selects parameters of histogram printout.
45	Sync Acquisition Threshold:	Select criteria for pattern synchronization acquisition.
46	Async Data Timeout:	Select action on no asynchronization data present.
60	Time/Date Setting:	Set time and date calendar.
99	Reset Aux Functions to Default:	Reset status select functions to their default values.

Training Manual

FIREBERD 6000
ASSEMBLY AND DISASSEMBLY

Introduction and Safety Precautions

This section contains special techniques and procedures required to disassemble, assemble, and configure the FIREBERD 6000.

The FIREBERD 6000's boards are installed in a layered configuration, which requires sequential removal and replacement. Therefore, the entire disassembly/assembly procedure is given in the order in which the boards must be removed and/or replaced, from first to last. If your FIREBERD is not equipped with the option or accessory referred to in the instructions, skip that step and proceed to the next applicable step.

The FIREBERD must be configured using extender boards. Extender boards enable access to all boards and enables the FIREBERD to be powered ON while disassembled.

To minimize shock hazard, the equipment chassis must be connected to an electrical ground. The instrument is equipped with a three-conductor AC power cable. The power cable must be either plugged into an approved three-contact adapter with grounding wire (green) firmly connected to an electrical ground at the power outlet.

PRIOR TO DISASSEMBLY:

1. All standard safety practices and procedures applicable to electronic equipment maintenance will apply throughout the conduct of this course.

2. High voltage is used in the operation of this equipment. DEATH ON CONTACT may result if personnel fail to observe safety precautions. Learn the areas containing high voltage in each piece of equipment. Be careful not to make contact with high-voltage connections when installing or operating this equipment. Before working INSIDE the equipment, turn the power off and ground points of high potential before touching them.

Disassembly and Assembly

Tools Required for Disassembly/Assembly of the FIREBERD 6000

1. Phillips Head screw drivers (various sizes)
2. Flat head screw drivers (various sizes)
3. nut driver
4. nut driver
5. .050 Allen wrench

Note: Only the disassembly procedures are shown. All tools required for assembly/ disassembly are the same: to assemble the unit, simply follow the disassembly directions in reverse.

Disassembly of the Front Bezel (FB6000MC)

PROCEDURE

1. Locate and remove the two screws (one on each side of the case) which hold the front bezel in place. If the case is equipped with a handle, press buttons on each side of the handle and rotate toward the rear of the case to expose screws. Thread locks slide in the side extrusion. Care should be taken not to lose the thread locks.

2. Pull the front bezel off the instrument

3. Slide top cover forward to free the cover from the rear bezel. Pull cover straight up.

Disassembly of the Top Cover (FB6000)

PROCEDURE

1. Turn FIREBERD upside down.

2. Remove four screws and bumpers (feet).

3. Turn instrument right side up. Grasp both sides of the top cover and pull up.

Disassembly of the Rear Bezel (FB6000MC)

PROCEDURE

1. Remove two screws (one on each side of the case) which hold the rear bezel in place.

2. Pull the rear bezel off the instrument.

Removal of the Data Interface (6000/6000MC)

PROCEDURE

1. Loosen two thumb screws on the rear panel of the instrument and remove the interface module currently installed

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Removal of the IEEE-488 Interface (6000/6000MC)

DESCRIPTION

The IEEE-488 has two modes of operation: talk only and Addressable. These modes are selected by the dip switches. The dip switches are read only on power up, so if changes are made, power should be cycled. The IEEE-488 plugs into the PROCESSOR board, which supplies the edge connector and the +5V needed by the interface.

PROCEDURE

1. Locate the IEEE-488 interface on the rear panel of the FIREBERD.

2. Remove the two Phillips Head Screws on the outside edges of the IEEE-488 interface and pull the module out of the instrument.

Removal of the EPROM Card (6000/6000MC)

DESCRIPTION

The EPROM board provides the software necessary to operate the FIREBERD, and plugs into the back of the PROCESSOR board. Through the direct connection with the EPROM board, the Processor board is able to obtain the necessary data to operate the FIREBERD, and permits the implementation of software upgrades without disassembling the instrument.

PROCEDURE

1. Locate the EPROM card at the rear center of the processor board.

2. Grasp the tab on the edge of the card and pull straight out of the white plastic card guide line.

Removal of the Clock Recovery Board (6000/6000MC)

DESCRIPTION

The Clock Recovery board option 6004 extracts a clock signal from the synchronous data stream received from the Received Data Multiplexer, which receives the data stream from the selected data interface. The output is used by the DG&R board as a recovered clock to sample the received data.

PROCEDURE

1. Remove the four 1/4", #4-40 Phillips head screws (and associated flat washers and lock washers) on the top of the board.

2. Grasping the board on both sides nearest the edge connector, pull straight up to release board from vertical connector.

Removal of the DS1 Jitter Generation Board (6000/6000MC)

PROCEDURE

1. Disconnect the plug end of the black cable labeled 30487-02 from the brass right angle connector located by the fan. The cable is connected to the interior side of the JIT MOD IN BNC connector. Remove the plug from the connector by gently wobbling the plug from side to side until it separates.

2. Use a 3/16" nut driver to remove the four standoffs securing the Jitter Generation board to DG&R board (40445 or 41002) below.

3. Pull the card edge of the Jitter Generation board out of connector on the back side of the Motherboard.

TTC™ A Dynatech Company

Removal of the DS1 Wideband Jitter Measurement Board (6000/6000MC)

PROCEDURE

1. Both shield and board are removed as one unit.

2. Disconnect the plug end of the black cable labeled 30487-01 from the brass right angle connector. The cable is connected to the interior side of the DEMOD JITTER OUT BNC connector. Remove the connector from the plug by gently wobbling the plug from side to side until it separates.

3. Use a 1/4" nut driver to remove the four standoffs securing the DS1 Wideband Jitter Measurement board to the DG&R board below (40445 or 41002). Do not remove the four screws which attach the shield to the board.

4. Grasp the DS1 Wideband Jitter Measurement board on each side, and pull straight back from the edge connector on the back side of the motherboard. List the back of the boards up slightly until the board clears the right angle RS-232 connectors on the back of the DG&R board. This provides adequate clearance for removing the board from the instrument.

Removal of the Spectral Analysis Board (6000/6000MC)

DESCRIPTION

The Jitter Spectral Analysis option 6008 is used with option 6007 to determine the spectral content of jitter timing in a clock. There are three points of calibration available on this board: R90, which enables calibration before the 750 khz signal is routed to the second mixer, and R50 and R52, which enable equalization of the mid band and high band filter outputs to the low band filter output

PROCEDURE

1. Remove the four 1/4", #A4-40 Phillips head screws (and associated flat washers and lock washers) on the top of the board.

2. Pull the card edge of the Jitter Spectral Analysis board out of the connector on the solder side of the DS1 Jitter Wideband Measurement board (40473) or the Jitter Generation and Wideband Measurement board (40663).

Removal of the Jitter Generation and Wideband Measurement Board (6000/6000MC)

DESCRIPTION

The Jitter Generation and Wideband Measurement option 6007 measures jitter over a wide frequency band (20hz to 10khz for 64kb/s; 20 hz to 100 khz for 2048 kb/s). The calibration points for jitter measurement and jitter generation are shown in the diagram below.

PROCEDURE

1. The shield and board are removed as one unit.

2. Disconnect the plug end of the black cable labeled 30487-01 from the brass right angle connector labeled J3 OUT. This cable is connected to the interior side of the DEMOD JITTER OUT BNC connector. Remove the connector from the plug by gently wobbling the plug from side to side until it separates.

3. Disconnect the plug end of the black cable labeled 30487-02 from the brass right angle connector labeled J4 IN. This cable is connected to the interior side of the JIT MOD IN BNC connector. Remove the plug from the connector by gently wobbling the plug from side to side until it separates.

Removal of the Jitter Generation and Wideband Measurement Board (6000/6000MC)

4. Use a 1/4" nut driver to remove the four standoffs securing the shield side of the Jitter Generation and Wideband Measurement board to the DG&R board below (40445 or 41002). Do not remove the four screws which attach the shield to the board.

5. Use a 3/16" nut driver to remove the four standoffs securing the Jitter Generation and Wideband Measurement board to the DG&R board below (40445 or 41002).

6. Grasp the Jitter Generation and Wideband Measurement board on each side. Pull the board straight back from the edge connectors on the back side of the motherboard. Lift the back of the board up slightly until the board clears the right angle RS-232 connectors on the back of the DG&R board. This provides adequate clearance for removing the board from the instrument.

Removal of the Data Generator and Receiver Board (FB6000MC)

Note 1: Prior to removing the DG&R board, determine if the installed actuator rod is attached or separated from the rear panel power switch.

Note 2: The rear panel must be partially removed before the DG&R board can be removed.

PROCEDURE
(with attached actuator rod)

1. Using a .05" Allen wrench. loosen the Allen nut on the actuator rod closest to the rear panel. This Allen nut attaches the actuator rod to the rear panel power switch. Only loosen the Allen nut enough to remove the actuator rod from the rear panel power switch.

2. Remove the two black oxide pan head screws on the rear panel above the RS232-C/V.24 data interface. Then remove the black oxide pan head screws at each end of the test point slot. Finally, remove the black oxide pan head screw (7/16") just above the chassis ground lug. (DO NOT REMOVE ANY OF THE FOUR SCREWS SECURING FAN ASSEMBLY OR ANY OTHER SCREW FROM THE REAR PANEL).

3. Disconnect the two-pin, white plastic connector supplying power to the fan assembly shown.

Removal of the Data Generator and Receiver Board (FB6000MC)

4. Remove the four stainless steel screws that hold the rear panel to the side expanders (two in the center of each side of the rear panel). After the screws have been removed, allow the rear panel to separate from the instrument. Don't attempt to pull the rear panel; all wires should remain attached to the rear panel.

5. Release the DG&R board by removing the four screws (and associated flat and lock washers) on the outside edges of the board that secure the board to the aluminum side braces.

6. Pivot the board to the left to release the right edge connector and then pull the DG&R board straight back to release the left edge connector. Lift the board straight up and out of the instrument.

Removal of the Generator and Receiver Board (FB6000)

PROCEDURE
(with attached actuator rod)

1. Using a .05" Allen wrench, loosen the Allen nut on the actuator rod closest to the rear panel. This Allen nut attaches the actuator rod to the rear panel power switch. Only loosen the Allen nut enough to remove the actuator rod from the rear panel power switch.

2. Loosen the two screws located on the top left and right corners of the rear panel. These screws attach the grounding brackets of the side expanders to the rear panel.

3. Loosen the two screws located on the top left and right corners of the User Interface board. These screws attach the grounding brackets of the side expanders to the front panel.

4. Remove the four screws (and associated flat and lock washers) that secure the outside edges of the DG&R board to the side brackets.

Removal of the Generator and Receiver Board (FB6000)

5. Loosen the four side bracket screws. The side brackets attach the DG&R, side expanders, and grounding brackets. Turn the side bracket to dislodge it from under the DG&R board.

6. Disconnect the two-pin, white plastic connector which supplies power to the fan assembly.

7. Remove the two black oxide pan head screws on the rear panel above the RS232-C/V.24 data interface. Then remove the black oxide pan head screws at each end of the test point slot. Finally, remove the black oxide pan head screw (7/16") just above the chassis ground lug. (DO NOT REMOVE ANY OF THE FOUR SCREWS SECURING FAN ASSEMBLY OR ANY OTHER SCREW FROM THE REAR PANEL).

8. Remove the side expanders by bending the side expanders out to release them from the front and rear panels, and the DG&R board. Once released pull the side expanders straight up.

9. To separate the rear panel from the instrument carefully slide it up and out of the bottom covers tracks. Do not attempt to pull the rear panel away from the unit, since wires remain attached to the rear panel.

10. Pivot the DG&R board to the left to release the right edge connector and then pull the DG&R board straight back to release the left edge connector. Lift the board straight up and out of the instrument.

Removal of the Data Generator and Receiver Board (FB6000MC with Separated Actuator Rod)

PROCEDURE

1. Remove the two black oxide pan head screws on the rear panel above the RS232-C/V.24 data interface. Then remove the black oxide pan head screws at each end of the test point slot. Finally, remove the black oxide pan head screw (7/16") just above the chassis ground lug. (DO NOT REMOVE ANY OF THE FOUR SCREWS SECURING FAN ASSEMBLY OR ANY OTHER SCREW FROM THE REAR PANEL).

2. Disconnect the two-pin, white plastic connector supplying power to the fan assembly shown.

3. Remove the four stainless steel screws that hold the rear panel to the side expanders (two in the center of each side of the rear panel). After the screws have been removed, allow the rear panel to separate from the instrument. Do not attempt to pull the rear panel away from the unit, since wires remain attached to the rear panel.

Removal of the Data Generator and Receiver Board (FB6000MC with Separated Actuator Rod)

4. Release the DG&R board by removing the four screws (and associated flat and lock washers) on the outside edges of the board that secure the board to the aluminum side braces.

5. Pivot the board to the left to release the right edge connector and then pull the DG&R board straight back to release the left edge connector. Lift the board straight up and out of the instrument.

Removal of the Data Generator and Receiver Board (FB6000 with Separated Actuator Rod)

PROCEDURE

1. Loosen the two screws located on the top left and right corners of the rear panel. These screws attach the grounding brackets of the side expanders to the rear panel.

2. Loosen the two screws located on the top left and right corners of the User Interface board. These screws attach the grounding brackets of the side expanders to the front panel.

3. Remove the four screws (and associated flat and lock washers) that secure the outside edges of the DG&R board to the side brackets.

4. Loosen the four side bracket screws. The side brackets attach the DG&R, side expanders, and grounding brackets. Turn the side bracket to dislodge it from under the DG&R board.

5. Disconnect the two-pin, white plastic connector which supplies power to the fan assembly.

Removal of the Generator and Receiver Board (FB6000)

6. Remove the two black oxide pan head screws on the rear panel above the RS232-C/V.24 data interface. Then remove the black oxide pan head screws at each end of the test point slot. Finally, remove the black oxide pan head screw (7/16") just above the chassis ground lug. (DO NOT REMOVE ANY OF THE FOUR SCREWS SECURING FAN ASSEMBLY OR ANY OTHER SCREW FROM THE REAR PANEL).

7. Remove the side expanders by bending the side expanders out to release them from the front and rear panels, and the DG&R board. Once released pull the side expanders straight up.

8. To separate the rear panel from the instrument carefully slide it up and out of the bottom covers tracks. Do not attempt to pull the rear panel away from the unit, since wires remain attached to the rear panel.

9. Pivot the DG&R board to the left to release the right edge connector and then pull the DG&R board straight back to release the left edge connector. Lift the board straight up and out of the instrument.

Removal of the Rear Panel

PROCEDURE

1. Disconnect the wiring harness from the power supply board by squeezing each side of the AMP connector and pulling out.

2. Remove the black plastic connector located next to the RS-232 printer/controller connector.

3. The rear panel may now be separated completely from the instrument.

Removal of the Power Supply Board

PROCEDURE

1. Remove the Phillips head screw (and associated washers) located at the front left corner of the transformer in the center of the power supply board.

2. On the right side of the power supply board, remove the Phillips head screw (and associated washers) located toward the front of the instrument NEXT to the black actuator push rod support block.

3. Remove the Phillips head screw (and associated washers) in the extreme right rear corner of the board.

Removal of the Power Supply Board

4. Access the Phillips head screw located inside the aluminum power supply shield by inserting a Phillips screwdriver into the small opening at the left rear of the shield top. CAREFULLY remove screw and washers.

5. Remove the Phillips head screws (and associated washers) which attach the actuator support block(s) to the power supply.

6. Hold the actuator rod away from the power supply and pull the power supply straight back out of its connector. Carefully lift it up and out of the instrument.

Removal of the (Separated) Actuator Rod

PROCEDURE

1. Disolodge the POWER ON/OFF pushbutton switch from the front panel. Locate between teh front panel and the POWER ON/'OFF switch the Allen nut that attaches the front panel POWER ON/OFF pushbutton switch to the actuator rod. Using a .05" Allen wrench, loosen the Allen nut. ONLY LOOSEN THE ALLENNUT ENOUGH TO REMOVE THE PUSHBUTTON SWITCH FROM THE ACTUATOR ROD. Remove the actuator rod.

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Removal of the (Attached) Actuator Rod

PROCEDURE

1. The actuator rod can not be removed from the Motherboard/User interface assembly. When troubleshooting, the actuator rod should not have contact with any board.

Removal of the Synthesizer

PROCEDURE

1. Remove the four Phillips head screws attaching the Synthesizer to the Processor board.

2. Pull straight up when removing the synthesizer to avoid damaging the bottom connector.

Removal of the Processor Board (FB6000MC)

PROCEDURE

1. Remove the two large metal Phillips head screws (and associated washers) in the rear corners of the processor board and the three white nylon flat head screws securing the board to the chassis.

2. Pull the Processor board out of its connector on the motherboard. To avoid damage to the processor board card edge, pivot the board to the left to separate the board from the right connector. Pull the board straight back to separate the board from the other connector before lifting the board up and out of the instrument.

Removal of the Processor Board (FB6000)

PROCEDURE

1. Remove the two large metal Phillips head screws (and associated washers) in the rear corners of the processor board and the three large metal Phillips head screws (and associated plastic washers) securing the board to the bottom cover.

2. Pull the processor board out of its connectors on the motherboard. To avoid damage to the processor board card edge, pivot the board to the left to separate the board from the right connector. Pull the board straight back to separate the board from the other connector before lifting the board up and out of the instrument.

Removal of the Front Panel (FB6000MC)

PROCEDURE

1. Remove the four srews (two on each side of the front panel) that secure the front panel to the chassis.

2. The front panel and the motherboard/user interface assembly will now separate from the instrument chassis.

Removal of the Motherboard (FB6000MC)

PROCEDURE

1. Before separating the motherboard/user interface assembly from the front panel, remove the plastic knob on the front panel VOLUME control switch with a flat head screw driver.

2. Remove the eight metal screws with nylon washers that secure the motherboard/user interface assembly to the from panel (seven on the outside perimeter of the user interface board and one directly the center of the board. These screws can be accessed through openings in the motherboard.

3. Separate the motherboard/user interface assembly from the from panel.

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Removal of the Motherboard (FB6000)

PROCEDURE

1. To remove the motherboard/user interface assembly from the bottom cover lift the motherboard/user interface assembly straight out of the bottom cover tracks.

2. Before separating the motherboard/user interface assembly from the front panel, remove the plastic knob on the front panel VOLUME control switch with a flat head screw driver.

3. Remove the eight metal screws with nylon washers that secure the motherboard/user interface assembly to the from panel (seven on the outside perimeter of the user interface board and one directly the center of the board. These screws can be accessed through openings in the motherboard.

4. Separate the motherboard/user interface assembly from the from panel.

Removal of the Handle

PROCEDURE

1. Disconnect the AC power cord from the FIREBERD

2. Remove the left and right pushbutton and spring on each side by inserting a small flat head screwdriver and prying gently. Remove the screw and washer from both sides. This will allow complete removal of the handle and ratchet mechanism.

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Removal of the Voltage/Fuse Select Housing

PROCEDURE

1. Press the mounting clips in on the Voltage/Fuse select housing.

2. To disconnect the housing from the rear panel pull the housing straight out of the rear panel.

Removal of the Power Switch

PROCEDURE

1. Remove the two black oxide screws holding the power switch to the rear panel.

Training Manual

FIREBERD 6000
CALIBRATION

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Oscillator Calibration

This procedure verifies the operation of the oscillator and describes the adjustments needed to ensure that the oscillator is operating within specifications. This procedure is applicable to FIREBERDs with or without Option 6006.

Required Equipment

BNC to BNC cable.
Frequency Counter (with 5 ppm or 0.5 ppm accuracy).
FLUKE 72 G1A or equivalent.
Non-Conductive Tuning Tool.

Oscillator Check

1. With the FIREBERD in the OFF position, connect a BNC cable from the GEN CLK OUT connector, located on the rear panel of the FIREBERD, to the input of the Frequency counter.
2. Set the Frequency counter for a 1 Hz resolution.
3. Power ON the FIREBERD.

STEP	SWITCH	SELECTION
4.	MENU	SYNTH FREQ
5.	Keypad	12000
6.	Keypad	Press ENTER.

7. Verify the synthesizer frequency measurement with the Frequency counter. If the value shown on the Frequency Counter is 12,000,000 Hz $\pm$ 120 Hz (5 ppm counter) or 12,000,000 Hz $\pm$ 66 Hz (0.5 ppm counter), the oscillator does not need calibration. If the value displayed on the Frequency Counter is not within the specified limits, proceed with the Preliminary Set-Up.

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Oscillator Calibration

Preliminary Set-Up

Remove the top cover of the FIREBERD. Without removing any boards identify if the DG&R board contains an oscillator adjustment hole. The oscillator adjustment hole is located next to the rear panel test point 12 on the DG&R board. If the DG&R board contains the oscillator adjustment hole, proceed with Test Procedures, Step 1. If the DG&R board does not contain the oscillator adjustment hole, proceed with Test Procedures, Step 2.

Test Procedures

1. Proceed with the following procedures if the DG&R board contains an oscillator adjustment hole.

STEP

1.1 Connect the BNC cable from the GEN CLK OUT BNC connector on the rear panel of the FIREBERD 6000 to the input of the Frequency counter.

1.2 Set the Synthesizer frequency (SYNTH FREQ) to the frequency value specified in Table 6.5.1 (Table 6.5.2 if Option 6006 is installed).

1.3 Carefully insert the tuning tool through the oscillator adjustment hole and adjust the 12M Hz Oscillator (Y3), located directly below on the Processor Board. Adjust the Oscillator (Y3) so that the Frequency Counter displays the frequency value within the specified tolerance for the frequencies listed in Table 6.5.1/6.5.2.

Oscillator Calibration

Table 6.5.1

Frequency	Tolerance 5 PPM Counter	Tolerance 0.5 PPM Counter
12 MHz	± 120 Hz	± 66 Hz
120 kHz	± 1.2 Hz	± 0.7 Hz
1.2 kHz	± 0.01 Hz	± 0.01 Hz

Table 6.5.2

Option 6006 installed (1 PPM Time Base)

Frequency	Tolerance 5 PPM Counter	Tolerance 0.5 PPM Counter
12 MHz	± 72 Hz	± 18 Hz
120 kHz	± 0.72	± 0.2 Hz
1.2 kHz	± 0.01 Hz	± 0.002 Hz

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Oscillator Calibration

STEP

1.4 Start the adjustments at 12 MHz. If calibration is achieved at 12 MHz, it is likely that all frequencies are within the specified tolerance.

1.5 When calibration is complete, perform Performance Test 5.18.

NOTE: If calibration cannot be achieved, refer to the Troubleshooting Guide, Section 7.17.

2. If the DG&R board does not have an oscillator adjustment hole, follow the disassembly instruction in Section 8 to configure the FIREBERD as shown in Figure 8-A3.

STEP

2.1 Place the scope probe between C102 (GND) and U-69 pin 12 (Signal). See Figure 7A-5.

2.2 Carefully insert the tuning tool into Y3, and adjust the 12 MHz Oscillator until the Frequency Counter displays a 12 MHz frequency value within the specified tolerance as listed in Table 6.5.1/6.5.2. Regardless of the frequency selected, a 12 MHz signal should exist at this location.

2.3 When calibration is complete, perform Performance Test 5.18.

NOTE: If calibration cannot be achieved, refer to the Troubleshooting Guide, Section 7.17.

DS1 Wideband Jitter Measurement Option 6001 Calibration Without Option 6003 Installed

Use this procedure to calibrate the DS1 Wideband Jitter Measurement 5V reference voltage and the DEMOD JITTER signal gain. This procedure is applicable to FIREBERDs without Option 6003 installed. If Option 6003 is available, refer to the following section. To locate board components refer to Figure 7A-6.

Required Equipment

Jitter Generator and Receiver
HP Model 3785B or equivalent.
Oscilloscope (with a minimum 100 MHz bandwidth)
TEKTRONIX 2246A or equivalent
Two oscilloscope probes.
Multimeter
FLUKE 45 or equivalent.
Clock Recovery Extender board (Part #40476).
BNC to BNC cable.
Tuning Tool.
Either interface may be used to perform this test.
DS1/T1/D4/ESF Interface (Model 40460).
DS1/T1/ESF/SIC-96 Interface (Model 40540).

DS1 Wideband Jitter Measurement Option 6001 Calibration Without Option 6003 Installed

Preliminary Set-Up

1. Remove power from the FIREBERD, and install either the DS1/T1/D4/ESF Interface (Model 40460) or the DS1/T1/ESF/SLC-96 Interface (Model 40540). Make sure the interface is fully inserted into the interface slot and that both thumb screws are secured.

2. Refer to Assembly/Disassembly, Section 8 for the appropriate disassembly instructions to remove the following boards:

Clock Recovery
DS1 Jitter Generation
DS1 Wideband Jitter Measurement

DS1 Wideband Jitter Measurement Option 6001 Calibration Without Option 6003 Installed

3. Install the Clock Recovery Extender board (40476) into connections J1 and J2 on the Motherboard. These connections house the Jitter Generation board and the Jitter Wideband Measurement board.

4. Install the DS1 Wideband Jitter Measurement board vertically into the Jitter Extender card. The component side of the Wideband Jitter Measurement board should face toward the back of the FIREBERD.

5. Secure the loose cables (30487-02 and 30487-01) connected to the FIREBERD rear panel.

6. Check that no stray metal such as loose hardware or loose connectors are on the boards.

7. Power ON the FIREBERD. Using a Multimeter, check TP3 on the Wideband Jitter Measurement board. Adjust R10 until the voltage present at this point is 5.000V DC $\pm$ 0.01V DC.

NOTE: If 5.000 V $\pm$ 0.01 V DC is not obtained at TP3, proceed to Troubleshooting Guide, Section 7.25.

DS1 Wideband Jitter Measurement Option 6001 Calibration Without Option 6003 Installed

STEP	SWITCH	SELECTION
8.	MENU	AUXILIARY
9.	Keypad	43
10.	Keypad	Press ENTER.
11.	Softkey	YES
12.	Softkey	YES

DS1 Wideband Jitter Measurement Option 6001 Calibration Without Option 6003 Installed

Test Set-Up

Configure the FIREBERD for testing with the following front panel switch settings.

STEP	SWITCH	SELECTION
1.	MENU	INTF SETUP
2.	Softkey	DS1/T1 (40540) or DS1/Fe (40460)
3.	Softkey	RESULT
4.	Softkey	LIVE
5.	Keypad	Press the up arrow key.
6.	Softkey	THRU
7.	Softkey	OFF
8.	Keypad	Press the up arrow key.
9.	Softkey	INPUT
10.	Softkey	TERM
11.	Keypad	Press the up arrow key.
12.	Keypad	Press the MORE key.
13.	Softkey	ERRINS
14.	Softkey	OFF
15.	Keypad	Press the up arrow key.

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DS1 Wideband Jitter Measurement Option 6001 Calibration Without Option 6003 Installed

Test Setup (continued)

16.	Softkey	CODING
17.	Softkey	AMI
18.	Keypad	Press the up arrow key.
19.	Softkey	FRAMED
20.	Softkey	OFF
21.	Keypad	Press the up arrow key.
22.	Keypad	Press the MORE key.
23.	Softkey	LBO
24.	Softkey	0
25.	DATA	MARK
26.	ERROR INSERT	OFF
27.	SELF LOOP	ON
28.	GEN CLK	SYNTH
29.	Left ANALYSIS CATEGORY	SIGNAL
30.	Left ANALYSIS RESULT	1SEC JTR
31.	ANALYSIS MODE	CONTINUOUS

DS1 Wideband Jitter Measurement Option 6001 Calibration Without Option 6003 Installed

Calibration

1. To measure the amplitude (width) of jitter on a T1 Clock, it is necessary to use the original unjittered reference T1 Clock to trigger the oscilloscope.

STEP

1.1 Attach a T-connector to the HP3785B Jittered Clock Output. Using a BNC to BNC cable, connect one end of the T-connector to CH1 of the oscilloscope. Locate JW1 on the DS1 Wideband Jitter Measurement board and remove the jumper sleeve. Using a BNC to Clip Lead cable, connect the other end of the T-connector to the center post of JW1 (Jitter Measurement board). If the board is a Rev. A, attach the cable to the A side of JW1. Attach the ground lead of the cable to the negative side of C85 (Jitter Measurement board). See Figure 7A-6.

DS1 Wideband Jitter Measurement Option 6001 Calibration Without Option 6003 Installed

OBS: When measuring the amplitude of a Jittered T1 Clock on an oscilloscope, 0.02 UIp-p of jitter is approximately 13 ns.

1.2 Set the Jitter Generator and Receiver (HP 3785B) to produce jitter at 0.30 UIp-p 50 Hz.

1.3 The oscilloscope should display a T1 Clock with a jitter width of approximately 195 ns. If the Jitter Generator and Receiver is not producing 195 ns of jitter on the T1 clock, increase/ decrease the jitter amplitude (UIp-p) until the jitter equals 195 ns.

1.4 Adjust R36 on the DS1 Wideband Jitter Measurement board until the left ANALYSIS RESULT 1SEC JTR equals 0.30 UIp-p ± 0.05 UI.

1.5 Set the Jitter Generator and Receiver (HP 3785B) to produce jitter at 0.30 UIp-p 40 kHz.

1.6 Repeat Steps 1.3 and 1.4.

1.7 Power OFF the FIREBERD.

1.8 Remove the DEMOD JITTER OUT BNC connector and cable (30487-01) located on the back panel of the FIREBERD.

DS1 Wideband Jitter Measurement Option 6001 Calibration Without Option 6003 Installed

STEP

1.9 Connect the plug end of cable (30487-01) to J2 located on the solder side of the Wideband Jitter Measurement board. See Figure 8A-4.

1.10 Use a BNC to BNC cable to connect the BNC end of cable 30487-01 to the input of the oscilloscope.

1.11 Power ON the FIREBERD.

1.12 A 40 kHz sine wave 30 mVp-p ± 5 mV should appear on the oscilloscope.

1.13 Power OFF the FIREBERD. Remove all test connections from the Jitter Generation board. Reinstall the jumper sleeve in JW1 and reinstall cable (30487-01) in the FIREBERD rear panel.

NOTE: If any portion of this Calibration procedure failed to meet the specified results, refer to the Troubleshooting Guide, Section 7.25.

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DS1 Wideband Jitter Measurement Option 6001 Calibration (Cont'd)

STEP	SWITCH	SELECTION
28.	GEN CLK	SYNTH
29.	Left ANALYSIS CATEGORY	SIGNAL
30.	Left ANALYSIS RESULT	1SEC JTR
31.	ANALYSIS MODE	CONTINUOUS

DS1 Wideband Jitter Measurement Option 6001 Calibration

1. To measure the amplitude (width) of jitter on a T1 Clock, it is necessary to use the original unjittered reference T1 Clock to trigger the oscilloscope.

STEP

1.1 Connect the RX connector of the either the DS1/T1/ESF Interface (Model 40460) or the DS1/T1/ESF/SLC-96 Interface (Model 40540) to the Data Output connector of the HP 3785B Jitter Generator using a WECO 310 to Bantam cable. Connect the TX connector of the either the DS1/T1/ESF Interface (Model 40460) or the DSI/T1/ESF/SLC-96 Interface (Model 40540) to the Data Input connector of the HP 3785B Jitter Generator using a WECO 310 bantam cable.

1.2 Set the Jitter Generator and Receiver (HP 3785B) to produce jitter at 0.30 UIp-p 50 Hz.

1.3 Adjust R36 on the DS1 Wideband Jitter Measurement board until the left ANALYSIS RESULT 1SEC JTR equals 0.30 UIp-p ± 0.05 UI.

1.4 Set the Jitter Generator and Receiver (HP 3785B) to produce jitter at 0.30 UIp-p 40 kHz.

1.5 Repeat Steps 1.3 and 1.4.

1.6 Power OFF the FIREBERD.

1.7 Remove the DEMOD JITTER OUT BNC connector and cable (30487-01) located on the back panel of the FIREBERD.

1.8 Connect the plug end of cable (30487-01) to J2 located on the solder side of the Wideband Jitter Measurement board. See Figure 8A-4.

1.9 Use a BNC to BNC cable to connect the BNC end of cable 30487-01 to the input of the oscilloscope.

1.10 Power ON the FIREBERD.

1.11 A 40 kHz sine wave 30 mVp-p ± 5 mV should appear on the oscilloscope.

1.12 Power OFF the FIREBERD. Remove all test connections from the Jitter Generation board. Remove the WECO 310 Bantam cables from either the DS1/T1/ESF Interface (Model 40460) or the DS1/T1/ESF/SLC-96 Interface (Model 40540).

NOTE: If any portion of this Calibration procedure failed to meet the specified results, refer to the *Troubleshooting Guide, Section 7.25.*

DS1 Wideband Jitter Measurement Option 6001 Calibration With Option 6003 Installed

This procedure uses the DS1 Jitter Generation Option 6003 to calibrate the DS1 Wideband Jitter Measurement 5V reference voltage and the DEMOD JITTER signal gain. This procedure is applicable to FIREBERDs with Option 6003 installed. If Option 6003 is not available, refer to the previous section.. To locate board components refer to Figure 7A-6.

Required Equipment

DS1 Jitter Generation Board Option 6001.
Oscilloscope (with a minimum 100 MHz bandwidth)
TEKTRONIX 2246A or equivalent.
Two oscilloscope probes.
Multimeter
FLUKE 45 or equivalent.
Clock Recovery Extender board (Part #40476).
BNC to BNC cable.
Either interface may be used to perform this test:
DS1/T1/D4/ESF Interface (Model 40460).
DS1/T1/ESF/SLC-96 Interface (Model 40540).

DS1 Wideband Jitter Measurement Option 6001 Calibration With Option 6003 Installed

Preliminary Set-Up

1. In order to perform this performance test, Option 6003 must be installed and calibrated to meet specifications. Refer to Section 8 for installation instructions and refer to Calibration Procedure 6.10 to calibrate Option 6003.

2. Remove power from the FIREBERD, and install either the DS1/T1/D4/ESF Interface (Model 40460) or the DS1/T1/ESF/SLC-96 Interface (Model 40540). Make sure the interface is fully inserted into the interface slot and that both thumb screws are secured.

3. Refer to Assembly/Disassembly, Section 8 for the appropriate disassembly instructions to remove the following boards:

   Clock Recovery
   DS1 Jitter Generation
   DS1 Wideband Jitter Measurement

4. Install the Clock Recovery Extender board (40476) into connections J1 and J2 on the Motherboard. These connections house the Jitter Generation board and the Jitter Wideband Measurement board.

5. Install the DS1 Jitter Generation board and the DS1 Wideband Jitter Measurement board vertically into the Clock Recovery Extender board. The component side of the Jitter boards should face toward the back of the FIREBERD. See Figure 8A-4.

6. Secure the loose cables (30487-02 and 30487-01) connected to the FIREBERD rear panel.

7. Check that no stray metal such as loose hardware or loose connectors are on the boards.

DS1 Wideband Jitter Measurement Option 6001 Calibration With Option 6003 Installed

8. Power ON the FIREBERD. Using a Multimeter, check TP3 on the DS1 Wideband Jitter Measurement board. Adjust R10 until the voltage present at this point is 5.000V DC ± 0.01V DC.

NOTE: If 5.000 V ± 0.01 VDC is not obtained at TP3, proceed to Troubleshooting Guide, Section 7.25.

STEP	SWITCH	SELECTION
9.	MENU	AUXILIARY
10.	Keypad	43
11.	Keypad	Press ENTER.
12.	Softkey	YES
13.	Softkey	YES

DS1 Wideband Jitter Measurement Option 6001 Calibration With Option 6003 Installed

Test Set-Up

Configure the FIREBERD for testing with the following front panel switch settings.

STEP	SWITCH	SELECTION
1.	MENU	INTF SETUP
2.	Softkey	DS1/T1 (40540) or DS1/Fe (40460)
3.	Softkey	RESULT
4.	Softkey	LIVE
5.	Keypad	Press the up arrow key.
6.	Softkey	THRU
7.	Softkey	OFF
8.	Keypad	Press the up arrow key.
9.	Softkey	INPUT
10.	Softkey	TERM
11.	Keypad	Press the up arrow key.
12.	Keypad	Press the MORE key.
13.	Softkey	ERRINS (40540) BPVINS (40460)
14.	Softkey	OFF
15.	Keypad	Press the up arrow key.
16.	Softkey	CODING
17.	Softkey	AMI
18.	Keypad	Press the up arrow key.
19.	Softkey	FRAMED
20.	Softkey	OFF
21.	Keypad	Press the up arrow key.
22.	Keypad	Press the MORE key.
23.	Softkey	LBO
24.	Softkey	0
25.	DATA	MARK
26.	ERROR INSERT	OFF
27.	SELF LOOP	ON

DS1 Wideband Jitter Measurement Option 6001 Calibration With Option 6003 Installed

28.	GEN CLK	SYNTH
29.	Left ANALYSIS CATEGORY	SIGNAL
30.	Left ANALYSIS RESULT	1SEC JTR

1. This procedure calibrates the DEMOD JITTER signal gain.

STEP	SWITCH	SELECTION
1.1	MENU	JITTER
1.2	Softkey	GEN
1.3	Softkey	MOD
1.4	Softkey	SINE
1.5	Keypad	Press the up arrow key.
1.6	Softkey	FREQ
1.7	Softkey	Hz
1.8	Keypad	50
1.9	Keypad	Press ENTER.
1.10	Keypad	Press the up arrow key twice.
1.11	Softkey	AMPL
1.12	Softkey	UIp-p
1.13	Keypad	0800
1.14	Keypad	Press ENTER twice.
1.15	Softkey	WDBAND
1.16	Softkey	FULL
1.17	Adjust R36 on the DS1 Jitter Measurement board until the left ANALYSIS RESULT 1SEC JTR display reads 8.00 ± 0.41 UI.	
1.18	Keypad	Press the up arrow key.
1.19	Softkey	GEN
1.20	Softkey	AMPL
1.21	Softkey	UIp-p
1.22	Keypad	0108
1.23	Keypad	Press ENTER.

DS1 Wideband Jitter Measurement Option 6001 Calibration With Option 6003 Installed

1.24	Adjust R36 on the DS1 Jitter Measurement board until the left ANALYSIS RESULT 1SEC JTR display reads 1.08 ± 0.08 UI. Verify that the results obtained in Step 1.17 are still valid. Adjustments to R36 may adversely affect previous calibrations. Verify all previous adjustment results after each additional adjustment.	
1.25	Keypad	Press the up arrow key twice.
1.26	Softkey	FREQ
1.27	Softkey	Hz
1.28	Keypad	40000
1.29	Keypad	Press ENTER.
1.30	Keypad	Press the up arrow key twice.
1.31	Softkey	AMPL
1.32	Softkey	UIp-p
1.33	Keypad	0030
1.34	Keypad	Press ENTER.
1.35	Adjust R36 on the DS1 Jitter Measurement board until the left ANALYSIS RESULT 1SEC JTR display reads 00.30 ± 0.05 UI. Verify that the results obtained in Steps 1.17 and 1.24 are still valid. Adjustments to R36 may adversely affect previous calibrations. Verify all previous adjustment results after each additional adjustment.	
1.36	Keypad	0198
1.37	Keypad	Press ENTER.
1.38	Power OFF the FIREBERD.	
1.39	Remove the DEMOD JITTER OUT BNC connector and cable (30487-01) located on the back panel of the FIREBERD.	
1.40	Connect the plug end of cable (30487-01) to J2 located on the solder side of the Wideband Jitter Measurement board.	
1.41	Use a BNC to BNC cable to connect the BNC end of cable 30487-01 to the input of the oscilloscope.	
1.42	Power ON the FIREBERD.	
OBS	Verify that a 198 mVp-p ± 25 mV 40 kHz sine wave is displayed on the oscilloscope screen.	

DS1 Wideband Jitter Measurement Option 6001 Calibration With Option 6003 Installed

Verify that the results obtained in Steps 1.17, 1.24, and 1.35 are still valid. Adjustments to R36 may adversely affect previous calibrations. Verify all previous adjustment results after each additional adjustment.

NOTE: If any portion of this Calibration procedure fails to meet the specified results, refer to the Troubleshooting Guide, Section 7.25.

DS1 Jitter Spectral Analysis Option 6002 Calibration (Board #40478)

Use this procedure to calibrate the gain of the Mid and High Band Filters to match the gain of the Low Band Filter, to adjust the amplitude of the 750 kHz signal, and to verify the operation of the internal oscillator on the DS1 Jitter Spectral Analysis board. This procedure is applicable to FIREBERDs with a DS1 Jitter Spectral Analysis board #40478 installed. To locate board components refer to Figure 7A-8.

Required Equipment

DS1 Wideband Jitter Measurement Option 6001
Frequency Counter
FLUKE 7261A or equivalent.
Frequency Generator
WAVETEK 178 or equivalent.
BNC cable with a clip lead connector.
Tuning Tool.
Either interface may be used to perform this test:
DS1/T1/D4/ESF Interface (Model 40460).
DS1/T1/ESF/SLC-96 Interface (Model 40540)

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DS1 Jitter Spectral Analysis Option 6002 Calibration (Board #40478)

Preliminary Set-Up

1. Remove power from the FIREBERD, and install either the DS1/T1/D4/ESF Interface (Model 40460) or the DS1/T1/ESF/SLC-96 Interface (Model 40540). Make sure the interface is fully inserted into the interface slot and that both thumb screws are secured.

2. Refer to Assembly/Disassembly, for the appropriate disassembly instructions to remove the following boards:

   Clock Recovery

   DS1 Jitter Generation

   The DS1 Wideband Jitter Measurement board and the DS1 Jitter Spectral Analysis board should not be removed.

3. Secure the loose cables (30487-02 and 30487-01) connected to the FIREBERD rear panel.

4. Check that no stray metal such as loose hardware or loose connectors are on the boards.

5. Power ON the FIREBERD.

6. Using the BNC cable connect the Frequency Counter to TP1 on the DS1 Jitter Spectral Analysis board. TP2 may be used as ground.

STEP	SWITCH	SELECTION
7.	MENU	AUXILIARY
8.	Keypad	43
9.	Keypad	Press ENTER.
10.	Softkey	YES
11.	Softkey	YES

DS1 Jitter Spectral Analysis Option 6002 Calibration (Board #40478)

Test Set-Up

Configure the FIREBERD for testing with the following front panel switch settings.

STEP	SWITCH	SELECTION
1.	DATA	MARK
2.	MENU	INTF SETUP
3.	Softkey	DS1/T1 (40540) or DS1/Fe (40460)
4.	MENU	SYNTH FREQ
5.	MORE key	Press twice.
6.	Softkey	1544
7.	MENU	JITTER
8.	Softkey	S/A
9.	Softkey	FREQ
10.	Softkey	UP or DOWN Press until 10 Hz is selected.
11.	Verify that the Frequency Counter has a reading of 4500.06 kHz or less.	
12.	Softkey	DOWN Press until 40 kHz is selected.
13.	Verify that the Frequency Counter has a reading of 4740 kHz or less.	
15.	Keypad	Press the up arrow key.
16.	Remove the Frequency Counter connections from TP1 on the DS1 Jitter Spectral Analysis board.	

NOTE: If the specified results are not obtained at TP1, proceed to Troubleshooting Guide, Section 7.26.

1. This procedure calibrates the gain of the Mid and High Band Filters to match the gain of the Low Band Filter.

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DS1 Jitter Spectral Analysis Option 6002 Calibration (Board #40478)

STEP		
1.1	Remove power from the FIREBERD.	
1.2	Move the jumper sleeve of JW1 and JW2 from position A to position B. See Figure 7A-8.	
1.3	Using the BNC cable connect the Frequency Generator to U34 pin 5 on the DS1 Jitter Spectral Analysis board. TP10 may be used as ground. See Figure 7A-8.	
1.4	Power ON the FIREBERD.	
1.5	Set the Frequency Generator to produce a 4 Hz 1 Vp-p sine wave with a 0 Vdc offset.	
STEP	SWITCH	SELECTION
1.6	Softkey	S/A
1.7	Softkey	FREQ
1.8	Softkey	UP Press until 133 Hz is selected.
1.9	Left ANALYSIS CATEGORY	SIGNAL
1.10	Left ANALYSIS RESULT	S/A

STEP	
1.11	Record the reading obtained in the left ANALYSIS RESULT S/A 133 Hz display.
1.12	Set the Frequency Generator to produce a 40 Hz 1 Vp-p sine wave with a 0 Vdc offset.

DS1 Jitter Spectral Analysis Option 6002 Calibration (Board #40478)

STEP	SWITCH	SELECTION
1.13	Softkey	UP Press until 1.3 kHz is selected.

STEP

1.14 Adjust R109 on the DS1 Jitter Spectral Analysis board until the left ANALYSIS RESULT S/A 1.3 kHz display equals the result obtained in STEP 1.11.

1.15 Set the Frequency Generator to produce a 400 Hz 1 Vp-p sine wave with a 0 Vdc offset.

STEP	SWITCH	SELECTION
1.16	Softkey	UP Press until 13 kHz is selected.

STEP

1.17 Adjust R106 on the DS1 Jitter Spectral Analysis board until the left ANALYSIS RESULT S/A 13 kHz display equals the result obtained in STEP 1.11.

1.18 Disconnect the Frequency Generator from U34 pin 5 and TP10.

1.19 Remove power from the FIREBERD

DS1 Jitter Spectral Analysis Option 6002 Calibration (Board #40478)

2. Use this procedure to adjust the amplitude of the 750 kHz signal.

STEP

2.1 Return jumper sleeve of JW2 to position A.

2.2 Power ON the FIREBERD.

2.3 Set the Frequency Generator to produce a 200 Hz 10 Vp-p sine wave with a 0 Vdc offset.

2.4 Using the BNC cable connect the Frequency Counter to TP5 on the DS1 Jitter Spectral Analysis board. TP4 may be used as ground. See Figure 7A-8.

STEP	SWITCH	SELECTION
2.5	Softkey	S/A
2.6	Softkey	FREQ
2.7	Softkey	DOWN Press until 200 Hz is selected.

STEP

2.8 Adjust R92 (see Figure 7A-8) on the DS1 Jitter Spectral Analysis board until the left ANALYSIS RESULT S/A 200 Hz display equals 10.00 UI $\pm$ 1.05 UI.

2.9 Disconnect the Frequency Generator from TP4 and TP5.

2.10 Return jumper JW1 to position A.

NOTE: If any portion of this Calibration procedure fails to meet the specified results, refer to the Troubleshooting Guide, Section 7.26.

DS1 Jitter Spectral Analysis Option 6002 Calibration (Board #40683)

Use this procedure to calibrate the gain of the Mid and High Band Filters to match the gain of the Low Band Filter, to adjust the amplitude of the 750 kHz signal, and to verify the operation of the internal oscillator on the DS1 Jitter Spectral Analysis board. This procedure is applicable to FIREBERDs with a DS1 Jitter Spectral Analysis board #40683 installed. To locate board components refer to Figure 7A-7.

Required Equipment

DS1 Wideband Jitter Measurement Option 6001
Frequency Counter
FLUKE 7261A or equivalent.
Frequency Generator
WAVETEK 178 or equivalent.
BNC cable with a clip lead connector.
Tuning Tool.
Either interface may be used to perform this test.
DS1/T1/D4/ESF Interface (Model 40460).
DS1/T1/ESF/SLC-96 Interface (Model 40540)

DS1 Jitter Spectral Analysis Option 6002 Calibration (Board #40683)

Preliminary Set-Up

1. Remove power from the FIREBERD, and install either the DS1/T1/D4/ESF Interface (Model 40460) or the DS1/T1/ESF/SLC-96 Interface (Model 40540). Make sure the interface is fully inserted into the interface slot and that both thumb screws are secured.

2. Refer to Assembly/Disassembly, Section 8 for the appropriate disassembly instructions to remove the following boards:

   Clock Recovery

   DS1 Jitter Generation

   The DS1 Wideband Jitter Measurement board and the DS1 Jitter Spectral Analysis board should not be removed.

3. Secure the loose cables (30487-02 and 30487-01) connected to the FIREBERD rear panel.
4. Check that no stray metal such as loose hardware or loose connectors are on the boards.
5. Power ON the FIREBERD.
6. Using the BNC cable connect the Frequency Counter to TP3 on the DS1 Jitter Spectral Analysis board. TP1 may be used as ground.

STEP	SWITCH	SELECTION
7.	MENU	AUXILIARY
8.	Keypad	43
9.	Keypad	Press ENTER.
10.	Softkey	YES
11.	Softkey	YES

DS1 Jitter Spectral Analysis Option 6002 Calibration (Board #40683)

Test Set-Up

Configure the FIREBERD for testing with the following front panel switch settings.

STEP	SWITCH	SELECTION
1.	DATA	MARK
2.	MENU	INTF SETUP
3.	Softkey	DS1/T1 (40540) or DS1/Fe (40460)
4.	MENU	SYNTH FREQ
5.	MORE key	Press twice.
6.	Softkey	1544
7.	MENU	JITTER
8.	Softkey	S/A
9.	Softkey	FREQ
10.	Softkey	UP or DOWN Press until 10 Hz is selected.

DS1 Jitter Spectral Analysis Option 6002 Calibration (Board #40683)

STEP		
11.	Verify that the Frequency Counter has a reading of 4500.06 kHz or less.	
STEP	SWITCH	SELECTION
12.	Softkey	DOWN Press until 40 kHz is selected.
STEP		
13.	Verify that the Frequency Counter has a reading of 4740 kHz or less.	
STEP	SWITCH	SELECTION
15.	Keypad	Press the up arrow key.
STEP		
16.	Remove the Frequency Counter connections from TP3 on the DS1 Jitter Spectral Analysis board.	

NOTE: If the specified results are not obtained at TP3, proceed to Troubleshooting Guide, Section 7.26.

DS1 Jitter Spectral Analysis Option 6002 Calibration (Board #40683)

1. This procedure calibrates the gain of the Mid and High Band Filters to match the gain of the Low Band Filter.

STEP

1.1 Remove power from the FIREBERD.

1.2 Move jumper sleeves of JW1 and JW3 from the NORM position to the CAL position. See Figure 7A-7.

1.5 Using the BNC cable connect the Frequency Generator to TP 10 on the DS1 Jitter Spectral Analysis board. TP9 may be used as ground. See Figure 7A-7.

1.3 Power ON the FIREBERD.

1.4 Set the Frequency Generator to produce a 4 Hz 1 Vp-p sine wave with a 0 Vdc offset.

STEP	SWITCH	SELECTION
1.6	Softkey	S/A
1.7	Softkey	FREQ
1.8	Softkey	UP Press until 133 Hz is selected.
1.9	Left ANALYSIS CATEGORY	SIGNAL
1.10	Left ANALYSIS RESULT	S/A

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DS1 Jitter Spectral Analysis Option 6002 Calibration (Board #40683)

STEP

1.11 Record the reading obtained in the left ANALYSIS RESULT S/A 133 Hz display.

1.12 Set the Frequency Generator to produce a 40 Hz 1 Vp-p sine wave with a 0 Vdc offset.

STEP	SWITCH	SELECTION
1.13	Softkey	UP Press until 1.3 kHz is selected.

STEP

1.14 Adjust R50 on the DS1 Jitter Spectral Analysis board until the left ANALYSIS RESULT S/A 1.3 kHz display equals the result obtained in STEP 1.11.

1.15 Set the Frequency Generator to produce a 400 Hz 1 Vp-p sine wave with a 0 Vdc offset.

STEP	SWITCH	SELECTION
1.16	Softkey	UP Press until 13 kHz is selected.

STEP

1.17 Adjust R55 on the DS1 Jitter Spectral Analysis board until the left ANALYSIS RESULT S/A 13 kHz display equals the result obtained in STEP 1.11.

1.18 Disconnect the Frequency Generator from TP10 and TP9.

1.19 Remove power from the FIREBERD

2. Use this procedure to adjust the amplitude of the 750 kHz signal.

STEP

2.1 Return the jumper sleeve of JW3 to the NORM position.
2.2 Power ON the FIREBERD.
2.3 Set the Frequency Generator to produce a 200 Hz 10 Vp-p sine wave with a 0 Vdc offset.
2.4 Using the BNC cable connect the Frequency Generator to TP4 on the DS1 Jitter Spectral Analysis board. TP5 may be used as ground. See Figure 7A-7.

STEP	SWITCH	SELECTION
2.5	Softkey	S/A
2.6	Softkey	FREQ
2.7	Softkey	DOWN Press until 200 Hz is selected.

STEP

2.8 Adjust R90 on the DS1 Jitter Spectral Analysis board until the left ANALYSIS RESULT S/A 200 Hz display equals 10.00 UI ± 1.05 UI.
2.9 Disconnect the Frequency Generator from TP4 and TP5.
2.10 Return the jumper sleeve of JW1 to the NORM position.

NOTE: If any portion of this Calibration procedure fails to meet the specified results, refer to the Troubleshooting Guide, Section 7.26.

DS1 Jitter Generation Option 6003 Calibration

This procedure calibrates the parameters associated with the ability of the DS1 Jitter Generation to phase-modulate a T1 signal. To locate board components refer to Figure 7A-9.

Required Equipment

Oscilloscope 100 MHz

TEKTRONIX 2246 A or equivalent.

Frequency Counter

FLUKE 7261A or equivalent.

Multimeter

FLUKE 45 or equivalent.

Wave Form Generator (capable of producing SINE waves at 100 Hz)

WAVETEK 178 or equivalent.

BNC cable.

2 Oscilloscope probes.

Tuning Tool.

Clock Recovery Extender board (Model 40476).

Either interface may be used to perform this test.

DS1/T1/D4/ESF Interface (Model 40460).

DS1/T1/ESF/SLC-96 Interface (Model 40540)

DS1 Jitter Generation Option 6003 Calibration

Preliminary Set-Up

1. Remove power from the FIREBERD, and install either the DS1/T1/D4/ESF Interface (Model 40460) or the DS1/T1/ESF/SLC-96 Interface (Model 40540). Make sure the interface is fully inserted into the interface slot and that both thumb screws are secured.

2. Refer to Assembly/Disassembly for the appropriate disassembly instructions to remove the following boards:
   - Clock Recovery
   - Jitter Generation
   - DS1 Wideband Jitter Measurement

3. Install the Clock Recovery Extender board (40476) into connections J1 and J2 on the Motherboard. These connections house the Jitter Generation board and the Jitter Wideband Measurement board.

4. Install the Jitter Generator board vertically into the Clock Recovery Extender board. The component side of the Jitter Generation board should face toward the back of the FIREBERD.

5. Secure the loose cables (30487-02 and 30487-01) connected to the FIREBERD rear panel.

6. Check that no stray metal such as loose hardware or loose connectors are on the boards.

7. Power ON the FIREBERD. Using a Multimeter check TP11 on the Jitter Generation board. See Figure 7A-9. The voltage present at this test point should equal 5 V dc.

NOTE: If 5 V is not obtained at TP11, proceed to Troubleshooting Guide, Section 7.27.

DS1 Jitter Generation Option 6003 Calibration

STEP	SWITCH	SELECTION
8.	MENU	AUXILIARY
9.	Keypad	43
10.	Keypad	Press ENTER.
11.	Softkey	YES
12.	Softkey	YES

Test Set-Up

Configure the FIREBERD for testing with the following front panel switch settings.

STEP	SWITCH	SELECTION
1.	MENU	INTF SETUP
2.	Softkey	DS1/T1 (40540) or DS1/Fe (40460)
3.	Softkey	RESULT
4.	Softkey	LIVE
5.	Keypad	Press the up arrow key.
6.	Softkey	THRU
7.	Softkey	OFF
8.	Keypad	Press the up arrow key.
9.	Softkey	INPUT
10.	Softkey	TERM

11.	Keypad	Press the up arrow key.
12.	Keypad	Press the MORE key.
13.	Softkey	ERRINS (40540) BPVINS (40460)
14.	Softkey	OFF
15.	Keypad	Press the up arrow key.
16.	Softkey	CODING
17.	Softkey	AMI
18.	Keypad	Press the up arrow key.
19.	Softkey	FRAMED
20.	Softkey	OFF
21.	Keypad	Press the up arrow key.
22.	Keypad	Press the MORE key.
23.	Softkey	LBO
24.	Softkey	0
25.	DATA	MARK
26.	ERROR INSERT	OFF
27.	SELF LOOP	ON
28.	GEN CLK	SYNTH
29.	Left ANALYSIS CATEGORY	SIGNAL
30.	Left ANALYSIS RESULT	RCV FREQ
31.	ANALYSIS MODE	CONTINUOUS

DS1 Jitter Generation Option 6003 Calibration

Test Procedures

1. This procedure calibrates the reference oscillator, which produces the internal T1 signal, to within specified tolerance levels.

STEP	SWITCH	SELECTION
1.1	MENU	JITTER
1.2	Softkey	GEN
1.3	Softkey	MOD
1.4	Keypad	Press MORE key.
1.5	Softkey	EXT

OBS: The left ANALYSIS RESULT RCV FREQ should equal approximately 1544000 Hz.

STEP

1.6 Connect the input of the Frequency Counter to TP9 on the Jitter Generation board (40531). Adjust Y1 on the Jitter Generator board to produce a signal at TP9 equal to 3088 kHz ± .0150 kHz.

DS1 Jitter Generation Option 6003 Calibration

2. This procedure calibrates the amplitude range of the Jitter Generation board when the internal modulation is selected.

STEP

2.1 Connect CH2 of the oscilloscope to TP16 on the Jitter Generation board (40531). See Figure 7A-9.

2.2 Connect CH1 of the oscilloscope to pin-9 (U10) on the Jitter Generation board. See Figure 7A-9. A DIP clip is recommended for this connection.

2.3 Set the oscilloscope CH1 and CH2 to 5 V/DIV and 0.5 us/DIV.

2.4 Set the oscilloscope trigger to CH1.

2.5 Set the oscilloscope coupling to dc.

STEP	SWITCH	SELECTION
2.6	MENU	JITTER
2.7	Softkey	GEN
2.8	Softkey	MOD
2.9	Softkey	SINE
2.10	Keypad	Press the up arrow key.
2.11	Softkey	FREQ
2.12	Keypad	50
2.13	Keypad	Press ENTER
2.14	Keypad	Press the up arrow key.
2.15	Softkey	AMPL
2.16	Softkey	UIp-p
2.17	Keypad	0780
2.18	Keypad	Press ENTER

DS1 Jitter Generation Option 6003 Calibration

STEP

2.19 Set the oscilloscope trigger slope to positive (leading edge).

2.20 CH1 of the oscilloscope should display a pulse with a single high and low level. This pulse is a T1 clock frequency divided by 8.

2.21 Set the oscilloscope magnification to X10.

2.22 Using the oscilloscope horizontal position knob, adjust the display until the trailing edge of the pulse from CH1 is in the center of the display.

2.23 CH2 of the oscilloscope should display transitions far to the left and right of the center. The center should contain a void.

STEP	SWITCH	SELECTION
2.24	Keypad	Press the up arrow key.
2.25	Softkey	UIp-p
2.26	Softkey	UP

Increase the jitter amplitude with each press of the UP softkey. The transitions on the right and left should move closer together.

2.28 When the two transitions are within 50 ns of each other, stop increasing the amplitude. See Figure 6.10.1.

2.29 The jitter amplitude on the MENU display should equal 7.92 UI $\pm$ 0.06 UI. If the amplitude is not within the specified results continue with the following instructions.

2.30 Record the actual jitter amplitude readings which appear on the MENU display.

DS1 Jitter Generation Option 6003 Calibration

STEP	SWITCH	SELECTION
2.31	Keypad	0800
2.32	Keypad	Press ENTER.

STEP

2.33 If the value recorded in Step 2.30 is less than 7.86 UI, a gap will exist between the left and right transitions of CH2. Use CH1 as a reference.

2.34 Adjust R39 on the Jitter Generation board until the left and right transitions align in the center. The left and right transition should not overlap. Use CH1 as a reference. See Figure 6.10.1.

2.35 If the value recorded in Step 2.30 is greater than 7.98 UI, overlapping will exist between the left and right transitions of CH2.

2.36 Adjust R39 on the Jitter Generation board until the left and right transitions align without overlapping. Use CH1 as a reference. See Figure 6.10.1.

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DS1 Jitter Generation Option 6003 Calibration

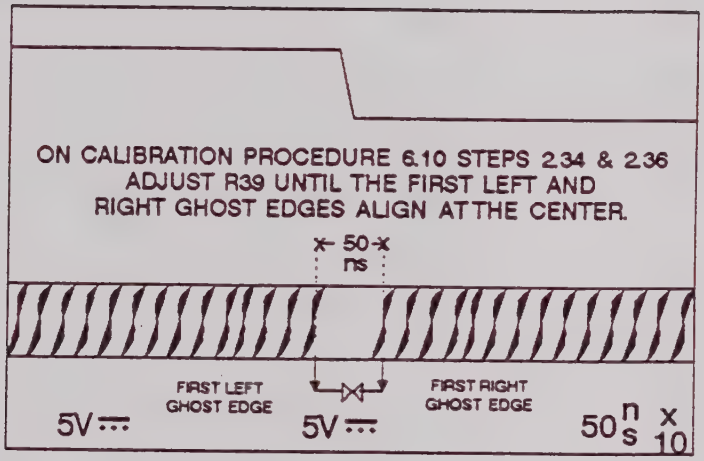

FIGURE 6.10.1

3. This procedure calibrates the amplitude gain of the Jitter Generation board when a high-frequency internal JITTER MOD signal is selected.

STEP	SWITCH	SELECTION
3.1	MENU	JITTER
3.2	Softkey	GEN
3.3	Softkey	FREQ
3.4	Softkey	Hz
3.5	Keypad	40000
3.6	Keypad	Press ENTER.
3.7	Keypad	Press the up arrow key.
3.8	Softkey	MOD
3.9	Softkey	SINE
3.10	Keypad	Press the up arrow key.
3.11	Softkey	AMPL
3.12	Softkey	UIp-p
3.13	Keypad	0108
3.14	Keypad	Press ENTER.

STEP

3.15 Set the oscilloscope time base to 1 us/DIV.

3.16 Set the oscilloscope trigger slope to a negative trailing edge.

3.17 Set the oscilloscope magnification for X10.

3.18 Using the oscilloscope position knob, adjust the display until the first rising edge of the clock from CH1 is in the center of the display.

3.19 The signal transitions of oscilloscope CH2 should occur between 700 ns ± 10 ns. See Figure 6.10.2.

3.20 If the distance between the signal transitions is not 700 ns ± 10, then adjust R29 on the the Jitter Generation board until the distance between transitions equals 700 ns.

DS1 Jitter Generation Option 6003 Calibration

4. This procedure calibrates the amplitude gain of the Jitter Generation board when the external JITTER MOD signal is selected.

STEP

4.1 Remove power from the FIREBERD.

4.2 Remove the JITTER MOD IN BNC connector and cable (30487-02) located on the back panel of the FIREBERD.

4.3 Connect the plug end of cable (30487-02) to J1 located on the solder side of the Jitter Generation board.

4.4 Use a BNC to BNC cable to connect the BNC end of the cable (30487-02) to the output of the Frequency Generator. Set the Frequency Generator to produce a 01.08 Vp-p 40 kHz sine wave with a dc offset of 0.

4.5 Power ON the FIREBERD.

STEP	SWITCH	SELECTION
4.6	Softkey	GEN
4.7	Softkey	MOD
4.8	MORE key	Press once.
4.9	Softkey	EXT

4.10 Verify that the time interval in which CH2 signal transitions occur in is 700 ns $\pm$ 10 ns. See Figure 6.10.2.

4.11 If the distance between the signal transitions is not 700 ns $\pm$ 10, adjust R28 on the the Jitter Generation board until the distance between transitions equals 700 ns.

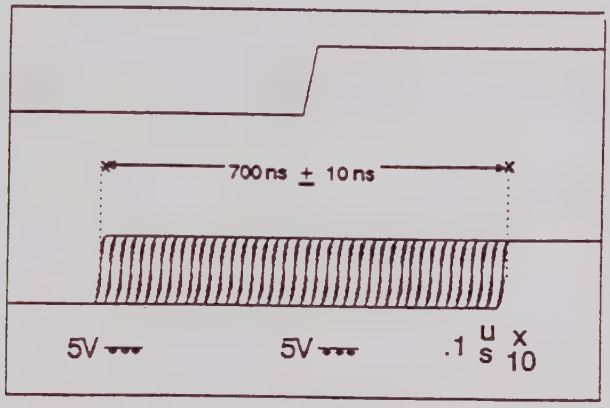

FIGURE 6.10.2

NOTE: If any portion of this Calibration procedure failed to meet the specified results, refer to the Troubleshooting Guide, Section 7.27

Jitter Generation and Wideband Measurement Option 6007 Calibration (Interface Model 30609)

This procedure calibrates the Jitter Generation and Wideband Measurement board (40663) using the CCITT G.704 2048 kb/s Interface Model 30609. To locate board components refer to Figure 7A-12. To fully calibrate the entire frequency range of Option 6007, both Calibration Procedures 6.11 and 6.12 (exclude Steps 3 and 6) should be peformed.

Required Equipment

Oscilloscope 100 MHz.
TEKTRONIX 2246 A or equivalent.
Frequency Counter.
FLUKE 7261A or equivalent.
Multimeter
FLUKE 45 or equivalent.
2 Oscilloscope probes.
Tuning Tool
Clock Recovery Extender board (Model 40476)
CCITT G.704 2048 kb/s Interface (Model 30609).

Jitter Generation and Wideband Measurement Option 6007 Calibration (Interface Model 30609)

Preliminary Set-Up

1. Remove power from the FIREBERD, and install the CCITT G.704 2048 kb/s Interface (Model 30609). Make sure the interface is fully inserted into the interface slot and that both thumb screws are secured.

2. Refer to Assembly/Disassembly, Section 8 for the appropriate disassembly instructions to remove the following boards:
   Clock Recovery
   Spectral Analysis

3. Install the Clock Recovery Extender board (40476) into connections J1 and J2 on the Motherboard. These connections house the Jitter Generation and Wideband Measurement board.

4. Install the Jitter Generation and Wideband Measurement board vertically into the Clock Recovery Extender board. The component side of the Jitter Generation and Wideband Measurement board should face toward the back of the FIREBERD. See Figure 7A-7.

5. Secure the loose cables (30487-02 and 30487-01) connected to the FIREBERD rear panel.

6. Check that no stray metal such as loose hardware or loose connectors are on the boards.

7. Power ON the FIREBERD.

Jitter Generation and Wideband Measurement Option 6007 Calibration (Interface Model 30609)

STEP	SWITCH	SELECTION
8.	MENU	AUXILIARY
9.	Keypad	43
10.	Keypad	Press ENTER
11.	Softkey	YES
12.	Softkey	YES

Test Set-Up

Configure the FIREBERD for testing with the following front panel switch settings.

STEP	SWITCH	SELECTION
1.	DATA	PRGM
2.	MENU	AUXILIARY
3.	Keypad	33
4.	Keypad	Press ENTER
5.	Keypad	0000
6.	MENU	INTF SETUP
7.	Softkey	2MG704
8.	Softkey	RESULTS
9.	Softkey	LIVE
10.	Keypad	Press the up arrow key.
11.	Softkey	FRAME
12.	Softkey	UNFRAME
13.	MENU	SYNTH FREQ
14.	MORE key	Press twice.
15.	Softkey	2048
16.	MENU	JITTER
17.	Softkey	GEN
18.	Softkey	MOD

19.	Softkey	Sine
20.	Keypad	Press the up arrow key.
21.	Softkey	FREQ
22.	Softkey	Hz
23.	Softkey	Press UP until 10 Hz is selected.
24.	Softkey	Press UP twice.
25.	Softkey	AMPL
26.	Softkey	UIp-p
27.	Keypad	1000
28.	Keypad	Press ENTER
29.	Keypad	Press the up arrow key.
30.	Left ANALYSIS CATEGORY	SIGNAL
31.	Left ANALYSIS RESULT	1SEC JTR
32.	Right ANALYSIS CATEGORY	SIGNAL
33.	Right ANALYSIS RESULT	JTR HITS

Jitter Generation and Wideband Measurement Option 6007 Calibration (Interface Model 30609)

Test Procedures

1. This procedure calibrates the dc reference voltage.

STEP

1.1 Using a multimeter measure the dc voltage at TP19 on the Jitter Generation and Wideband Measurement board. The dc voltage at TP19 should equal 5.120 V ± 0.005 V.

1.2 If the dc voltage at TP19 is not equal to the specified results, adjust R122 until the voltage at TP19 equals 5.120 V ± 0.005 V.

2. This procedure calibrates the internal reference oscillator.

STEP

2.1 Using a Frequency Counter measure the frequency at TP22 on the Jitter Generation and Wideband Measurement board. The signal at TP22 should equal 409600 kHz ± 0.041 kHz (5 ppm counter) or 4096.00 kHz ± 0.023 kHz (.5 ppm counter).

2.2 If the signal at TP22 does not equal the specified results adjust Y1 until the signal measured at TP22 equals 4096.00 kHz ± 0.041 kHz (5 ppm counter) or 4096.00 kHz ± 0.023 kHz (.5 ppm counter).

3. This procedure calibrates the zero jitter output.

STEP

3.1 Connect CH2 of the oscilloscope to TP16 on the Jitter Generation and Wideband Measurement board.

3.2 Connect CH1 of the oscilloscope to TP17 on the Jitter Generation and Wideband Measurement board.

3.3 Set oscilloscope CH1 and CH2 tp 5 V/Div and set the Time Base to 0.5 us/DIV.

3.4 Set the oscilloscope trigger to CH1.

3.5 Set the trigger slope to negative (trailing edge).

3.6 Set the oscilloscope coupling to DC.

3.7 Set the oscilloscope to X10 magnification.

3.8 Using the oscilloscope horizontal position knob, adjust the display until the leading edge of the pulse from CH1 is centered on the display.

Jitter Generation and Wideband Measurement Option 6007 Calibration (Interface Model 30609)

STEP	SWITCH	SELECTION
3.9	Keypad	Press the up arrow key.
3.10	Softkey	FREQ
3.11	Keypad	1000
3.12	Keypad	ENTER
3.13	Keypad	Press the up arrow key.
3.14	Softkey	AMPL
3.15	Softkey	UIp-p
3.16	Keypad	0000
3.17	Keypad	Press ENTER

STEP

3.18 Adjust R124 (Jitter Generation and Wideband Measurement board 40663), to produce a leading edge pulse with no jitter (ghost transitions) on CH2.

Jitter Generation and Wideband Measurement Option 6007 Calibration (Interface Model 30609)

4. This procedure calibrates the 8.00 UI.

STEP	SWITCH	SELECTION
4.1	Keypad	0780

STEP

4.2 CH2 of the oscilloscope should display transitions far to the left and right of the center. The center of the left and right transitions should contain a void. Record the value of the center void. The center void should equal 100 ns $\pm$ 75 ns.

STEP	SWITCH	SELECTION
4.3	Keypad	0800
4.4	Keypad	Press ENTER

STEP

4.5 If the value recorded in Step 4.2 is greater than 100 ns, a void will exists between the left and right transitions. Adjust R13 (Jitter Generation and Wideband Measurement board 40663) until the left and right transitions align in the center. The left and right transitions should not overlap. See Figure 6.11.1.

4.6 If the value recorded in Step 4.2 is less than 100 ns, overlapping will exists between the left and right transitions. Adjust R13 (Jitter Generation and Wideband Measurement board 40663) until the left and right transitions align in the center. The left and right transitions should not overlap. See Figure 6.11.1.

Jitter Generation and Wideband Measurement Option 6007 Calibration (Interface Model 30609)

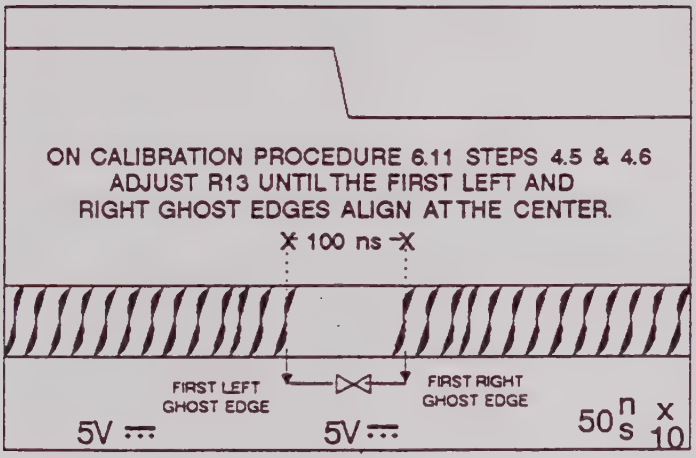

FIGURE 6.11.1

5. This procedure calibrates the 5 kHz - 32 kHz frequency response.

STEP	SWITCH	SELECTION
5.1	Keypad	0100
5.2	Keypad	Press ENTER
5.3	Keypad	Press the up arrow key twice.
5.4	Softkey	FREQ
5.5	Softkey	26900

STEP

5.6 Observe oscilloscope CH2. Measure and record the time range in which the signal transitions (ghost edges) occur. The range should equal 488 ns ± 48 ns.

5.7 If the value recorded in Step 5.6 does not equal 488 ns ± 48 ns adjust R8 (Jitter Generation and Wideband Measurement board 40663) until the range of transition (ghost edges) equals 488 ns ± 48 ns. See Figure 6.11.2.

STEP	SWITCH	SELECTION
5.8	Keypad	1000
5.9	Keypad	Press ENTER

Jitter Generation and Wideband Measurement Option 6007 Calibration (Interface Model 30609)

STEP

5.10 Verify that oscilloscope CH2 contains signal transitions (ghost edges) which occur between the range of 488 ns ± 48 ns. See Figure 6.11.2.

STEP	SWITCH	SELECTION
5.11	Keypad	Press the up arrow key.
5.12	Softkey	AMPL
5.13	Softkey	UIp-p

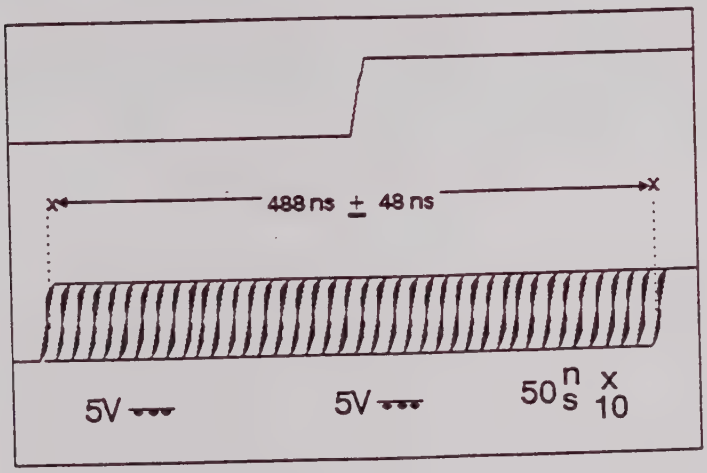

FIGURE 6.11.2

6. This procedure calibrates the 27.1 kHz - 100 kHz frequency response.

STEP	SWITCH	SELECTION
6.1	Keypad	0090
6.2	Keypad	Press ENTER
6.3	Keypad	Press the up arrow key twice.
6.4	Softkey	FREQ
6.5	Softkey	100000

STEP

6.6 Observe oscilloscope CH2. Measure and record the time range between the occurrence of each signal transition (ghost edges). The time range should equal 439 ns ± 24 ns. See Figure 6.11.3.

6.7 If the value recorded in Step 6.6 does not equal 439 ns ± 24 ns adjust R7 (Jitter Generation and Wideband Measurement board 40663) until the time range between each signal transition (ghost edges) equals 439 ns ± 24 ns. See Figure 6.11.3.

Jitter Generation and Wideband Measurement Option 6007 Calibration (Interface Model 30609)

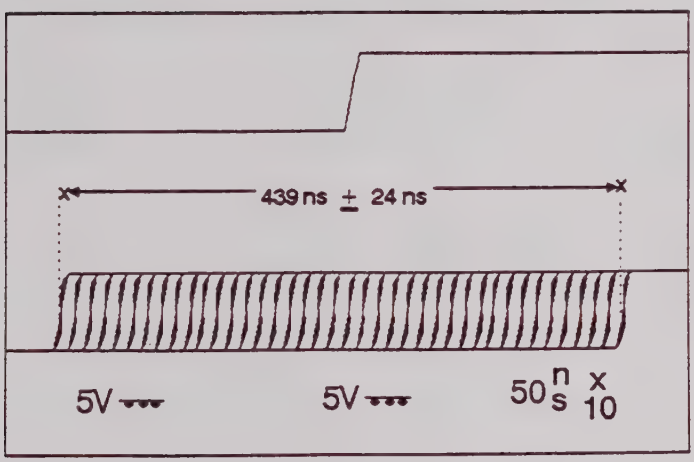

FIGURE 6.11.3

Jitter Generation and Wideband Measurement Option 6007 Calibration (Interface Model 30609)

STEP	SWITCH	SELECTION
6.8	Keypad	27200
6.9	Keypad	Press ENTER

STEP

6.10 Verify that oscilloscope CH2 contains signal transitions (ghost edges) which occur within the time range of 439 ns ± 24 ns. See Figure 6.11.3.

STEP	SWITCH	SELECTION
6.11	Keypad	Press the up arrow key.
6.12	Softkey	AMPL
6.13	Softkey	UIp-p

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Jitter Generation and Wideband Measurement Option 6007 Calibration (Interface Model 30609)

7. This procedure calibrates the peak jitter measurement.

STEP	SWITCH	SELECTION
7.1	Keypad	0350
7.2	Keypad	Press ENTER
7.3	Keypad	Press the up arrow key twice.
7.4	Softkey	FREQ
7.5	Softkey	100
7.6	Keypad	Press ENTER twice.
7.7	Softkey	RANGE
7.8	Softkey	BAND1
7.9	Keypad	Press the up arrow key once.
7.10	Softkey	GEN
7.11	Softkey	FREQ

STEP

7.12 Set the oscilloscope magnification to X10.

7.13 Set the oscilloscope time base to 0.2 us/DIV.

7.14 Using the oscilloscope horizontal position knob, adjust the display until the leading edge of the CH1 pulse is centered on the display.

7.15 Observe oscilloscope CH2. Measure and record the time range between the occurrence of each signal transition (ghost edges).

OBS: At a 2048 kb/s bit rate, 1 UI equals 488 ns of jitter (ghost edge transitions).

Jitter Generation and Wideband Measurement Option 6007 Calibration (continued)

STEP

7.16 Determine the expected ANALYSIS RESULT 1 SEC JTR by using the following formula:

$$\text{ANALYSIS RESULT 1 SEC JTR} = \frac{\text{Value recorded in Step 7.15} \times 1\ \text{UI}}{488\ \text{ns}}$$

7.17 Adjust R68 (Jitter Generation and Wideband Measurement board 40663) until the left ANALYSIS RESULT 1 SEC JTR display equals the value obtained in Step 7.16 $\pm$ 5% $\pm$ 0.035 UI.

Jitter Generation and Wideband Measurement Option 6007 Calibration (Interface Model 30609)

8. This procedure calibrates the -3 dB point loop gain.

STEP	SWITCH	SELECTION
8.1	Keypad	2
8.2	Keypad	Press ENTER
8.3	Keypad	Press the up arrow key.
8.4	Softkey	AMPL
8.5	Softkey	UIp-p
8.6	Keypad	1000
8.7	Keypad	Press ENTER.
8.8	Keypad	Press the up arrow key twice.
8.9	Softkey	FREQ

STEP

8.10 Adjust R135 (Jitter Generation and Wideband Measurement board 40663) until the left ANALYSIS RESULT 1 SEC JTR display equals 7.07 UI $\pm$ 0.39 UI.

8.11 Repeat all steps associated with Procedure 7.

Jitter Generation and Wideband Measurement Option 6007 Calibration (Interface Model 30609)

9. This procedure calibrates the amplitude level of the DEMOD JITTER signal which is routed to the Jitter Spectral Analysis Option 6008.

STEP	SWITCH	SELECTION
9.1	Keypad	10000
9.2	Keypad	Press ENTER
9.3	Keypad	Press the up arrow key.
9.4	Softkey	AMPL
9.5	Softkey	UIp-p
9.6	Keypad	0050
9.7	Keypad	Press ENTER.

STEP

9.8 Verify that the left ANALYSIS RESULT 1 SEC JTR equals 0.50 UI ± 0.065 UI.

9.9 CAREFULLY, without removing power from the FIREBERD, move the JW1 jumper (Jitter Generation and Wideband Measurement board 40663) from the NORM position to the CAL position.

9.10 Adjust R71 (Jitter Generation and wideband Measurement board 40663) until the left ANALYSIS RESULT 1 SEC JTR display equals 1.00 UI ± 0.20 UI

9.11 Power OFF the FIREBERD and return the JW1 jumper to the NORM position.

NOTE: If any portion of this Calibration procedure fails to meet the specified results, refer to the Troubleshooting Guide, Section 7.30.

Jitter Generation and Wideband Measurement Option 6007 Calibration (Interface Model 30608)

This procedure calibrates the Jitter Generation and Wideband Measurement board (40663) using a the CCITT G.703 64 kb/s Interface Model 30608. To locate board components refer to Figure 7A-12. To fully calibrate the entire frequency range of Option 6007, both Calibration Procedures 6.11 and 6.12 (exclude Steps 3 and 6) should be performed.

Required Equipment

Oscilloscope 100 MHz.
TEKTRONIX 2246 A or equivalent.
Frequency Counter.
FLUKE 7261A or equivalent.
Multimeter
FLUKE 45 or equivalent.
2 Oscilloscope probes.
Tuning Tool
Clock Recovery Extender board (Model 40476)
CCITT G.703 64 kb/s Interface (Model 30608).

Jitter Generation and Wideband Measurement Option 6007 Calibration (Interface Model 30608)

Preliminary Set-Up

1. Remove power from the FIREBERD, and install the CCITT G.703 64 kb/s Interface (Model 30608). Make sure the interface is fully inserted into the interface slot and that both thumb screws are secured.

2. Refer to Assembly/Disassembly, Section 8 for the appropriate disassembly instructions to remove the following boards:
   - Clock Recovery
   - Spectral Analysis

3. Install the Clock Recovery Extender board (40476) into connections J1 and J2 on the Motherboard. These connections house the Jitter Generation and Wideband Measurement board.

4. Install the Jitter Generation and Wideband Measurement board vertically into the Clock Recovery Extender board. The component side of the Jitter Generation and Measurement board should face toward the back of the FIREBERD. See Figure 8A-7.

5. Secure the loose cables (30487-02 and 30487-01) connected to the FIREBERD rear panel.

6. Check that no stray metal such as loose hardware or loose connectors are on the boards.

7. Power ON the FIREBERD.

Jitter Generation and Wideband Measurement Option 6007 Calibration (Interface Model 30608)

STEP	SWITCH	SELECTION
8.	MENU	AUXILIARY
9.	Keypad	43
10.	Keypad	Press ENTER
11.	Softkey	YES
12.	Softkey	YES

13. Connect CH2 of the oscilloscope to TP16 on the Jitter Generation and Wideband Measurement board.

14. Connect CH1 of the oscilloscope to TP17 on the Jitter Generation and Wideband Measurement board.

15. Set oscilloscope CH1 and CH2 to 5 V/DIV and set the timebase to 10 us/DIV.

16. Set the oscilloscope trigger to CH1.

17. Set the trigger slope to negative (trailing edge).

18. Set the oscilloscope coupling to dc.

19. Set the oscilloscope to X10 magnification.

20. Using the oscilloscope horizontal position knob, adjust the display until the leading edge of the pulse from CH1 is centered on the display.

Jitter Generation and Wideband Measurement Option 6007 Calibration (Interface Model 30608)

Test Set-Up

Configure the FIREBERD for testing with the following front panel switch settings.

STEP	SWITCH	SELECTION
1.	DATA	MARK
2.	MENU	INTF SETUP
3.	Softkey	64G703
4.	MORE key	Press
5.	Softkey	OCTET
6.	Softkey	ON
7.	MENU	SYNTH FREQ
8.	MORE key	Press twice.
9.	Softkey	64
10.	MENU	JITTER
11.	Softkey	GEN
12.	Softkey	MOD
13.	Softkey	SINE
14.	Left ANALYSIS CATEGORY	SIGNAL
15.	Left ANALYSIS RESULT	1SEC JTR
16.	Right ANALYSIS CATEGORY	SIGNAL
17.	Right ANALYSIS RESULT	JTR HITS

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Jitter Generation and Wideband Measurement Option 6007 Calibration (Interface Model 30608)

Test Procedures

1. This procedure calibrates the dc reference voltage.

STEP

1.1 Using a multimeter measure the dc voltage at TP19 on the Jitter Generation and Wideband Measurement board. The dc voltage measured at TP19 should equal 5.120 V ± 0.005 V

1.2 If the dc voltage at TP19 does not equal the specified results, adjust R122 until the voltage at TP19 equals 5.120 V ± 0.005 V.

2. This procedure calibrates the internal reference oscillator.

STEP

2.1 Using a frequency counter measure the frequency at TP22 on the Jitter Generation and Wideband Measurement board. The signal at TP22 should equal 4096.00 kHz ± 0.041 kHz (5 ppm counter) or 4096.00 kHz ± 0.023 kHz (.5 ppm counter).

2.2 If the signal at TP22 does not equal the specified results adjust Y1 until the signal measured at TP22 equals 4096.00 ± 0.041 kHz (5 ppm counter) or 4096.00 kHz ± 0.023 kHz (.5 ppm counter).

3. This procedure calibrates the zero jitter output.

STEP	SWITCH	SELECTION
3.1	Keypad	Press the up arrow key.
3.2	Softkey	FREQ
3.3	Keypad	100
3.4	Keypad	ENTER
3.5	Keypad	Press the up arrow key.
3.6	Softkey	AMPL
3.7	Softkey	UIp-p
3.8	Keypad	0000
3.9	Keypad	Press ENTER
3.10	Keypad	Press the up arrow key.

STEP

3.11 Adjust R124 (Jitter Generation and Wideband Measurement board 40663), to produce a leading edge pulse with no jitter (ghost transitions) on CH2.

Jitter Generation and Wideband Measurement Option 6007 Calibration (Interface Model 30608)

4. This procedure calibrates the 2 kHz - 4.99 kHz frequency response.

STEP	SWITCH	SELECTION
4.1	Keypad	Press the up arrow key once.
4.2	Softkey	AMPL
4.3	Softkey	UIp-p
4.4	Keypad	0400
4.5	Keypad	Press ENTER
4.6	Keypad	Press the up arrow key twice.
4.7	Softkey	FREQ
4.8	Softkey	4990

STEP

4.9 Observe Oscilloscope CH2. Measure and record the time range in which the signal transitions (ghost edges) occur. The range should equal 6.25 us ± 0.5 us. See Figure 6.12.1.

4.10 If the value recorded in Step 4.6 does not equal 6.25 us ± 0.5 us adjust R52 (Jitter Generation and Wideband Measurement board 40663) until the range of transition (ghost edges) equals 6.25 us ± 0.5 us. See Figure 6.12.1.

STEP	SWITCH	SELECTION
4.11	Keypad	100
4.12	Keypad	Press ENTER

STEP

4.13 Verify that oscilloscope CH2 contains signal transitions (ghost edges) which occur between the range of 6.25 us ± 0.5 us.

STEP	SWITCH	SELECTION
4.14	Keypad	Press the up arrow key.
4.15	Softkey	AMPL
4.16	Softkey	UIp-p

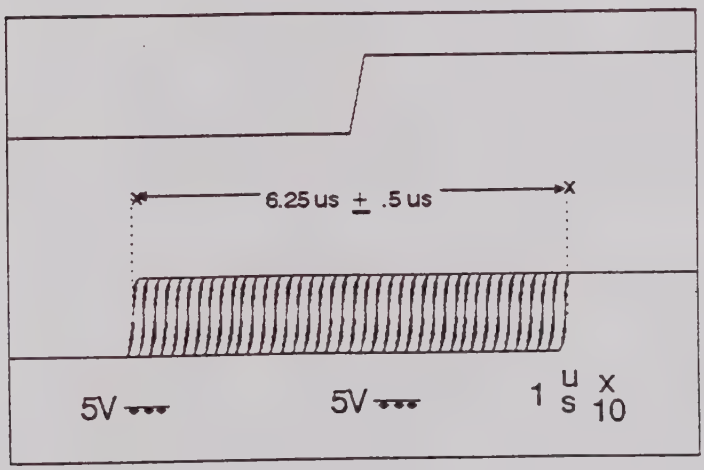

FIGURE 6.12.1

Jitter Generation and Wideband Measurement Option 6007 Calibration (Interface Model 30608)

5. This procedure calibrates the 5 kHz - 32 kHz frequency response.

STEP	SWITCH	SELECTION
5.1	Keypad	0100
5.2	Keypad	Press ENTER
5.3	Keypad	Press the up arrow key twice.
5.4	Softkey	FREQ
5.5	Softkey	31900

STEP

5.6 Set oscilloscope CH1 and CH2 to 5 V/DIV. Set the timebase to 0.2 us/DIV.

5.7 Using the oscilloscope horizontal position knob, adjust the display until the leading edge of the pulse from CH1 is centered on the display.

STEP

5.8 Observe Oscilloscope CH2. Measure and record the time range in which the signal transitions (ghost edges) occur. The range should equal 1.56 us ± .28 us. See Figure 6.12.2.

5.9 If the value recorded in Step 5.8 does not equal 1.56 us ± .287 us adjust R8 (Jitter Generation and Wideband Measurement board 40663) until the range of transition (ghost edges) equals 1.56 us ± .28 us. See Figure 6.12.2.

Jitter Generation and Wideband Measurement Option 6007 Calibration (Interface Model 30608)

STEP	SWITCH	SELECTION
5.10	Keypad	5000
5.11	Keypad	Press ENTER

STEP

5.12 Verify that oscilloscope CH2 contains signal transitions (ghost edges) which occur between the range of 1.56 us ± .28 us.

STEP	SWITCH	SELECTION
5.12	Keypad	Press the up arrow key.
5.13	Softkey	AMPL
5.14	Softkey	UIp-p

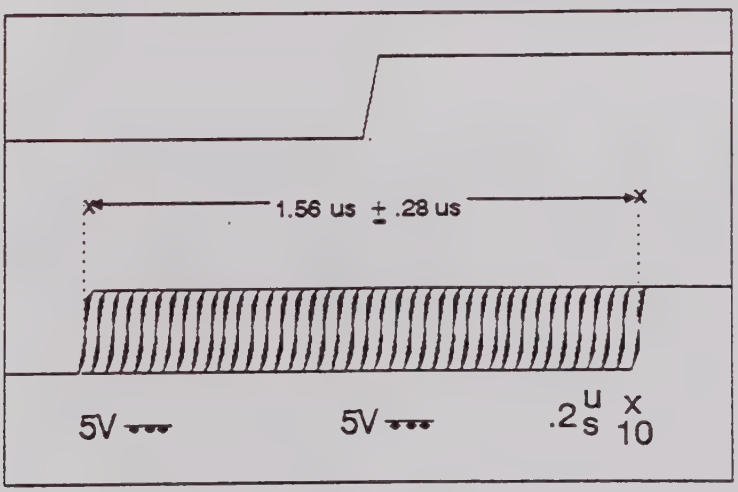

FIGURE 6.12.2

Jitter Generation and Wideband Measurement Option 6007 Calibration (Interface Model 30608)

6. This procedure calibrates the peak jitter measurement.

STEP	SWITCH	SELECTION
6.1	Keypad	0400
6.2	Keypad	Press ENTER
6.3	Keypad	Press the up arrow key twice.
6.4	Softkey	FREQ
6.5	Softkey	100
6.6	Keypad	Press ENTER twice.
6.7	Softkey	RANGE
6.8	Softkey	BAND1
6.9	Keypad	Press the up arrow key once.
6.10	Softkey	GEN
6.11	Softkey	FREQ

STEP

6.12 Set the oscilloscope magnification to X10.

6.13 Set the oscilloscope time base to 1 us/DIV.

6.14 Using the oscilloscope horizontal position knob, adjust the display until the leading edge of the pulse from CH1 is centered on the display.

6.15 Observe oscilloscope CH2. Measure and record the time range in which the signal transitions (ghost edges) occur.

At a 64 kb/s bit rate, 1 UI equals 15.625 us of jitter (ghost edge transitions).

6.16 Determine the expected ANALYSIS RESULT 1 SEC JTR by using the following formula:

$$\text{ANALYSIS RESULT 1 SEC JTR} = \frac{\text{Value recorded in Step 6.15} \times 1\ \text{UI}}{15.625\ \text{us}}$$

Jitter Generation and Wideband Measurement Option 6007 Calibration (Interface Model 30608)

6.17 Adjust R68 (Jitter Generation and Wideband Measurement board 40663) until the left ANALYSIS RESULT 1 SEC JTR display equals the value obtained in Step 7.16 ± 5% ± 0.035 UI.

NOTE: If any portion of this Calibration procedure fails to meet the specified results, refer to the Troubleshooting Guide, Section 7.30.

Jitter Spectral Analysis Option 6008 Calibration (Board #40683)

Use this procedure to calibrate the gain of the Mid and High Band Filters to match the gain of the Low Band Filter, to adjust the amplitude of the 750 kHz signal, and to verify the operation of the internal oscillator on the Jitter Spectral Analysis board. This procedure is applicable to FIREBERDs with a Jitter Spectral Analysis board #40683 installed. To locate board components refer to Figure 7A-13.

Required Equipment

Frequency Counter
FLUKE 726/A or equivalent.
Frequency Generator
WAVETEK 178 or equivalent.
BNC cable with a clip lead connector.
Tuning Tool.
Either interface may be used to perform this test:
CCITT G.703 2048 kb/s Interface (Model 30609).
CCITT G.703 64 kb/s Interface (Model 30608).

Jitter Spectral Analysis Option 6008 Calibration (Board #40683)

Preliminary Set-Up

1. Remove power from the FIREBERD, and install either the CCITT G.703 2048 kb/s Interface (Model 30609) or the CCITT G.703 64 kb/s Interface (Model 30608). Make sure the interface is fully inserted into the interface slot and that both thumb screws are secured.

2. Refer to Assembly/Disassembly, Section 8 for the appropriate disassembly instructions to remove the following boards:

   Clock Recovery

3. Check that no stray metal such as loose hardware or loose connectors are on the boards.

4. Power ON the FIREBERD. Using the BNC cable connect the Frequency Counter to TP3 on the Jitter Spectral Analysis board. TP1 may be used as ground.

STEP	SWITCH	SELECTION
5.	MENU	AUXILIARY
6.	Keypad	43
7.	Keypad	Press ENTER.
8.	Softkey	YES
9.	Softkey	YES

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Jitter Spectral Analysis Option 6008 Calibration (Board #40683)

Test Set-Up

Configure the FIREBERD for testing with the following front panel switch settings.

STEP	SWITCH	SELECTION
1.	DATA	MARK
2.	MENU	INTF SETUP
3.	Softkey	2M6704 (30609) or 64G703 (30608)
4.	MENU	SYNTH FREQ
5.	MORE key	Press twice.
6.	Softkey	2048 (30609) or 64 (30608)
7.	MENU	JITTER
8.	Softkey	S/A
9.	Softkey	SWEEP
10.	Softkey	UP or DOWN Press until 10 Hz is selected.

11. Verify that the Frequency Counter has a reading of 4500.06 kHz or less.

Jitter Spectral Analysis Option 6008 Calibration (Board #40683)

STEP	SWITCH	SELECTION
12.	Softkey	DOWN Press until 40 kHz is selected.

13. Verify that the Frequency Counter has a reading of 4740 kHz or less.

STEP	SWITCH	SELECTION
14.	Keypad	Press the up arrow key.

15. Remove the Frequency Counter connections from TP3 on the Jitter Spectral Analysis board.

NOTE: If the specified results are not obtained at TP3, proceed to Troubleshooting Guide, Section 7.31.

Jitter Spectral Analysis Option 6008 Calibration (Board #40683)

1. This procedure calibrates the gain of the Mid and High Band Filters to match the gain of the Low Band Filter.

STEP

1.1 Remove power from the FIREBERD.
1.2 Move jumpers JW1 and JW3 from the NORM position to the CAL position.
1.3 Using the BNC cable connect the Frequency Generator to TP10 on the G.703 Jitter Spectral Analysis board. TP9 may be used as ground.
1.4 Power ON the FIREBERD.
1.5 Set the Frequency Generator to produce a 4 Hz 1 Vp-p sine wave with a 0 Vdc offset.

STEP	SWITCH	SELECTION
1.6	Softkey	S/A
1.7	Softkey	FREQ
1.8	Softkey	UP Press until 133 Hz is selected.
1.9	Left ANALYSIS CATEGORY	SIGNAL
1.10	Left ANALYSIS RESULT	S/A

Jitter Spectral Analysis Option 6008 Calibration (Board #40683)

STEP

1.11 Record the reading obtained in the left ANALYSIS RESULT S/A 133 Hz display.

1.12 Set the Frequency Generator to produce a 40 Hz 1 Vp-p sine wave with a 0 Vdc offset.

STEP	SWITCH	SELECTION
1.13	Softkey	UP Press until 1.3 kHz is selected.

STEP

1.14 Adjust R50 on the Jitter Spectral Analysis board until the left ANALYSIS RESULT S/A 1.3 kHz display equals the result obtained in STEP 1.11.

1.15 Set the Frequency Generator to produce a 400 Hz 1 Vp-p sine wave with a 0 Vdc offset.

STEP	SWITCH	SELECTION
1.16	Softkey	UP Press until 13 kHz is selected.

STEP

1.17 Adjust R55 on the Jitter Spectral Analysis board until the left ANALYSIS RESULT S/A 13 kHz display equals the result obtained in STEP 1.11.

1.18 Disconnect the Frequency Generator from TP10 and TP9.

1.19 Remove power from the FIREBERD

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Jitter Spectral Analysis Option 6008 Calibration (Board #40683)

2. Use this procedure to adjust the amplitude of the 750 kHz signal.

STEP

2.1 Return jumper JW3 to the NORM position.
2.2 Power ON the FIREBERD.
2.3 Set the Frequency Generator to produce a 200 Hz 10 Vp-p sine wave with a 0 Vdc offset.
2.4 Using the BNC cable connect the Frequency Counter to TP4 on the G.703 Jitter Spectral Analysis board. TP5 may be used as ground.

STEP	SWITCH	SELECTION
2.5	Softkey	S/A
2.6	Softkey	FREQ
2.7	Softkey	DOWN Press until 200 Hz is selected.

STEP

2.8 Adjust R90 on the Jitter Spectral Analysis board until the left ANALYSIS RESULT S/A 200 Hz display equals 10.00 UI ± 1.05 UI.
2.9 Disconnect the Frequency Generator from TP4 and TP5.
2.10 Return jumper JW1 to the NORM position.

NOTE: If any portion of this Calibration procedure fails to meet the specified results, refer to the Troubleshooting Guide, Section 7.31.

FB6000
TROUBLESHOOTING

Troubleshooting Guide

7.1 INTRODUCTION

Preventive maintenance performed on a regular basis should reveal most potential problems before an instrument malfunctions. However, should troubleshooting be required, the following information is provided to facilitate location of a fault.

7.2 PREPARATION

The troubleshooting trees are to be used as an aid in locating malfunctioning circuitry. To use the trees, begin with the Preliminary Troubleshooting Tree. This tree will help to identify problem areas and will direct you to other appropriate troubleshooting trees for further troubleshooting. Use Table 7.1 to identify symptoms addressed by the Troubleshooting Trees.

The Troubleshooting Trees may require some disassembly of the FIREBERD. The Assembly/Disassembly, Section 8 contains instructions on disassembly, assembly and configuration of the FIREBERD with extender boards. Refer to Table 7.2 for FIREBERD configuration with extender boards. To aid in locating test points on boards use Figures 7A-1 through 7A-13.

After replacement of any electrical component the performance of the instrument should be verified. See Performance Tests, Section 5.

7.3 SAFETY PRECAUTIONS

USE PROPER LINE VOLTAGE SETTING AND FUSE SIZE.

Before switching on the instrument, make sure the instrument line voltage selector card is positioned for the correct operating voltage. See Section 2.5.2, Voltage Selection.

GROUND THE INSTRUMENT

To minimize shock hazard, the instrument chassis must be connected to an electrical ground. The instrument is equipped with a three-conductor AC power cable. The power cable must either be plugged into an approved three-contact adaptor with grounding wire (green) firmly connected to an electrical ground (safety ground) at the power outlet.

Troubleshooting Guide

TURN OFF POWER BEFORE INSERTING AND REMOVING INTERFACE MODULES OR BOARD ASSEMBLIES.
SERVICE AND ADJUSTMENTS SHOULD BE PERFORMED ONLY BY QUALIFIED SERVICE PERSONNEL.
READ ALL CAUTIONS AND WARNINGS
The service information found in this manual is often used with power supplied to and protective covers removed from the instrument. Read all applicable cautions and warnings, since energy available at many points may, if contacted, result in personal injury.

CAPACITORS INSIDE THE INSTRUMENT MAY STILL BE CHARGED EVEN IF THE INSTRUMENT HAS BEEN DISCONNECTED FROM ITS SOURCE OF POWER.

CAUTION
CLEARING NOVRAM USING AUXILIARY FUNCTION 43 WILL DELETE ALL PREVIOUSLY PROGRAMMED TEST CONFIGURATIONS.

USE CARE WHEN POWERING INSTRUMENT ON WHILE CONFIGURED WITH EXTENDER BOARDS
To power the FIREBERD ON while configured with extender boards, press the white power switch located next to the Voltage/Fuse Select Housing on the inside of the rear panel. Do not touch any part of the Voltage/Fuse Select Housing while the FIREBERD is powered ON.

CAUTION
Use care when checking voltages and waveforms around the IC so that adjacent leads are not shorted together. An IC test clip provides a convenient means of clipping a test probe to an IC.

7.4 TROUBLESHOOTING SYMPTOMS

Table 7.4.1 references a symptom to a Troubleshooting Tree.

TABLE 7.4.1
TROUBLESHOOTING TREE SYMPTOMS

SYMPTOM	TROUBLESHOOTING TREE
Audio Failure	Tree 7.6
BPV Insertion/Measurement is inoperable	Tree 7.7
Clock Slip Count circuitry is inoperable.	Tree 7.8
CLK INV indicator is not functioning.	Tree 7.8
Data Transmission/Reception is inoperable with the internal RS-232/V.24 Interface.	Tree 7.9
Data patterns are not programmable.	Tree 7.10
ERROR INSERT switch is not functioning correctly.	Tree 7.10
DATA pattern selection is not operating correctly.	Tree 7.11
The front-panel display is not operating correctly.	Tree 7.11
Delay measurements are unavailable or they are inaccurate.	Tree 7.12
The FIREBERD accumulates errors in Asynchronous Communication.	Tree 7.13
NOVRAM LOSS message upon POWER ON.	Tree 7.14
Does not retain front-panel switch settings.	Tree 7.14
Fan is not operating correctly.	Tree 7.15
Front-panel switches and keys are not operating correctly.	Tree 7.16
Not synchronizing correctly.	Tree 7.17
Is transmitting a frequency other than the one selected.	Tree 7.17
Front-panel display is not functioning correctly.	Tree 7.18
Failure message is received when POWERED ON.	Tree 7.19
Synchronous Long User Pattern not available.	Tree 7.20
Unable to print.	Tree 7.21
Unable to enter Remote Mode.	Tree 7.21
Results from the ALARMS ANALYSIS CATEGORY not available.	Tree 7.22
Power Supply (40741) is not operating correctly.	Tree 7.23
Hamond Power Supply is not operating correctly.	Tree 7.24

Troubleshooting Guide

TABLE 7.4.1 (continued)

Option 6001 is not functioning correctly.	Tree 7.25
Option 6002 is not available or inaccurate.	Tree 7.26
Option 6003 is not functioning correctly.	Tree 7.27
Option 6004 is not functioning correctly.	Tree 7.28
Unable to print using IEEE-488 Interface.	Tree 7.29
Unable to enter Remote Mode when using the IEEE-488 Interface.	Tree 7.29
Option 6007 is not functioning correctly.	Tree 7.30
Option 6008 is not functioning correctly.	Tree 7.31

TABLE 7.4.2
FIREBERD CONFIGURATION

CONFIGURATION	ASSEMBLY/DISASSEMBLY
Top Assembly	Section 8.8.3
Options 6001, 6002, 6003	Section 8.8.4
Options 6004	Section 8.8.5
Option 6005	Section 8.8.6
Option 6007 and 6008	Section 8.8.7

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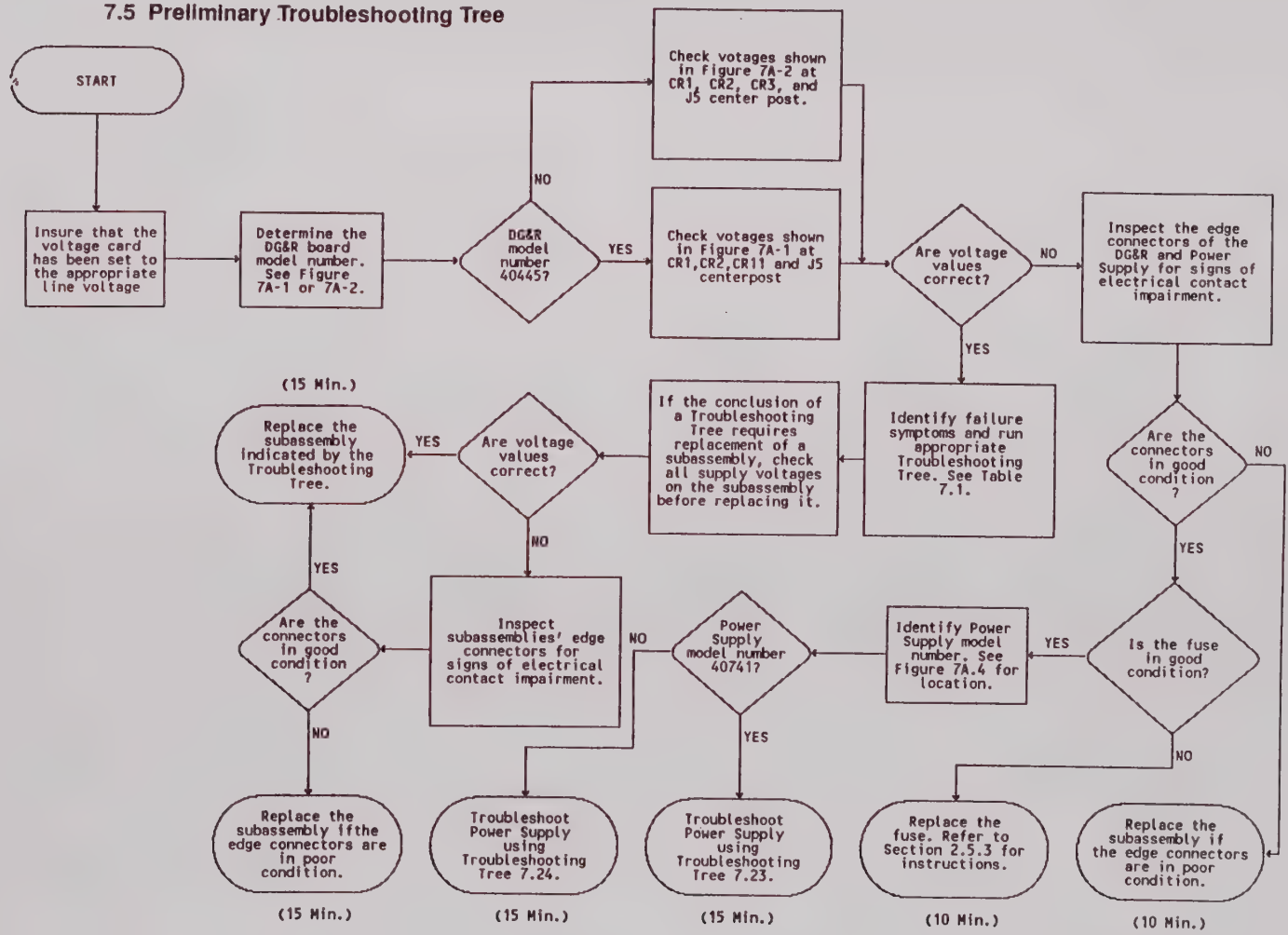
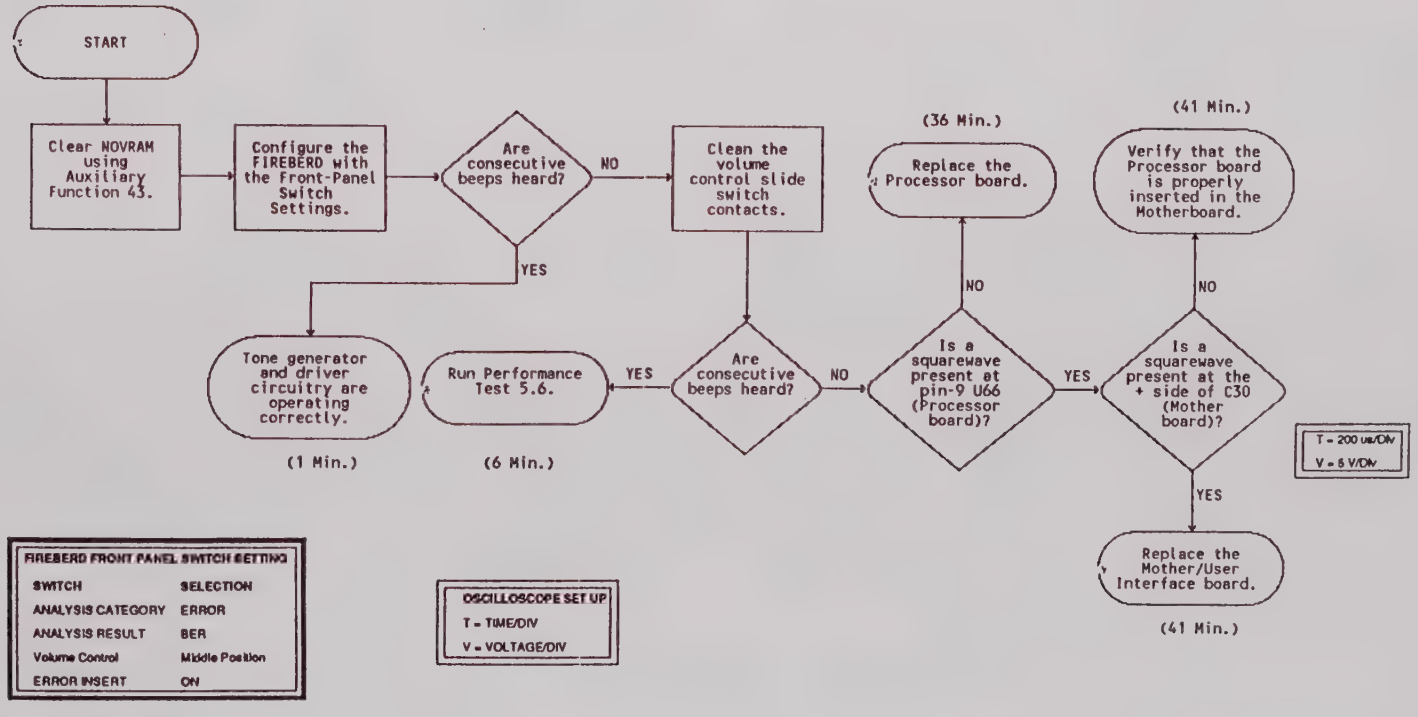
7.5 Preliminary Troubleshooting Tree


START
Insure that the voltage card has been set to the appropriate line voltage
Determine the DG&R board model number. See Figure 7A-1 or 7A-2.
DG&R model number 40445?
NO
YES
Check votages shown in Figure 7A-2 at CR1, CR2, CR3, and J5 center post.
Check votages shown in Figure 7A-1 at CR1,CR2,CR11 and J5 centerpost
Are voltage values correct?
NO
YES
Inspect the edge connectors of the DG&R and Power Supply for signs of electrical contact impairment.
Are the connectors in good condition ?
NO
YES
Is the fuse in good condition?
YES
NO
Identify Power Supply model number. See Figure 7A.4 for location.
Identify failure symptoms and run appropriate Troubleshooting Tree. See Table 7.1.
If the conclusion of a Troubleshooting Tree requires replacement of a subassembly, check all supply voltages on the subassembly before replacing it.
Are voltage values correct?
YES
NO
Replace the subassembly indicated by the Troubleshooting Tree.
(15 Min.)
Power Supply model number 40741?
NO
YES
Inspect subassemblies' edge connectors for signs of electrical contact impairment.
Are the connectors in good condition ?
YES
NO
Replace the fuse. Refer to Section 2.5.3 for instructions.
(10 Min.)
Replace the subassembly if the edge connectors are in poor condition.
(10 Min.)
Troubleshoot Power Supply using Troubleshooting Tree 7.23.
(15 Min.)
Troubleshoot Power Supply using Troubleshooting Tree 7.24.
(15 Min.)
Replace the subassembly ifthe edge connectors are in poor condition.
(15 Min.)

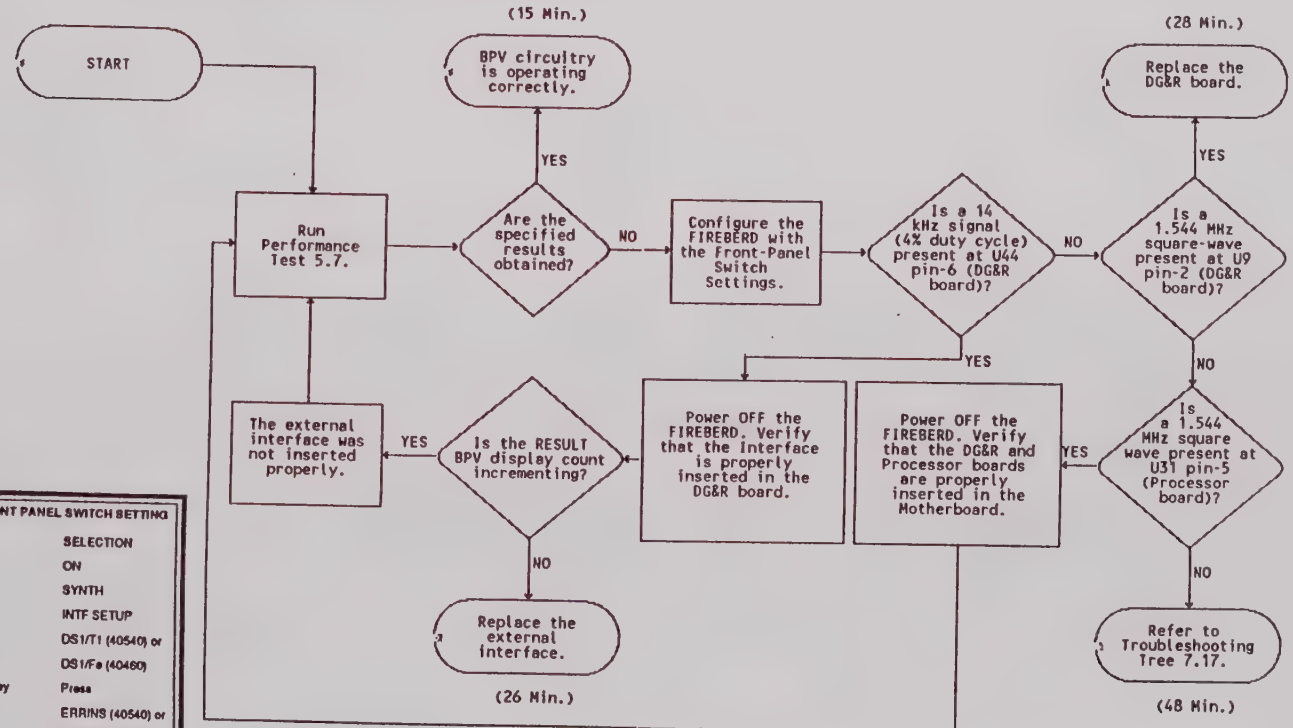
7.6 Troubleshooting Tree

Audio Failure.



7.7 Troubleshooting Tree

BPV Insertion/Measurement is Inoperable.

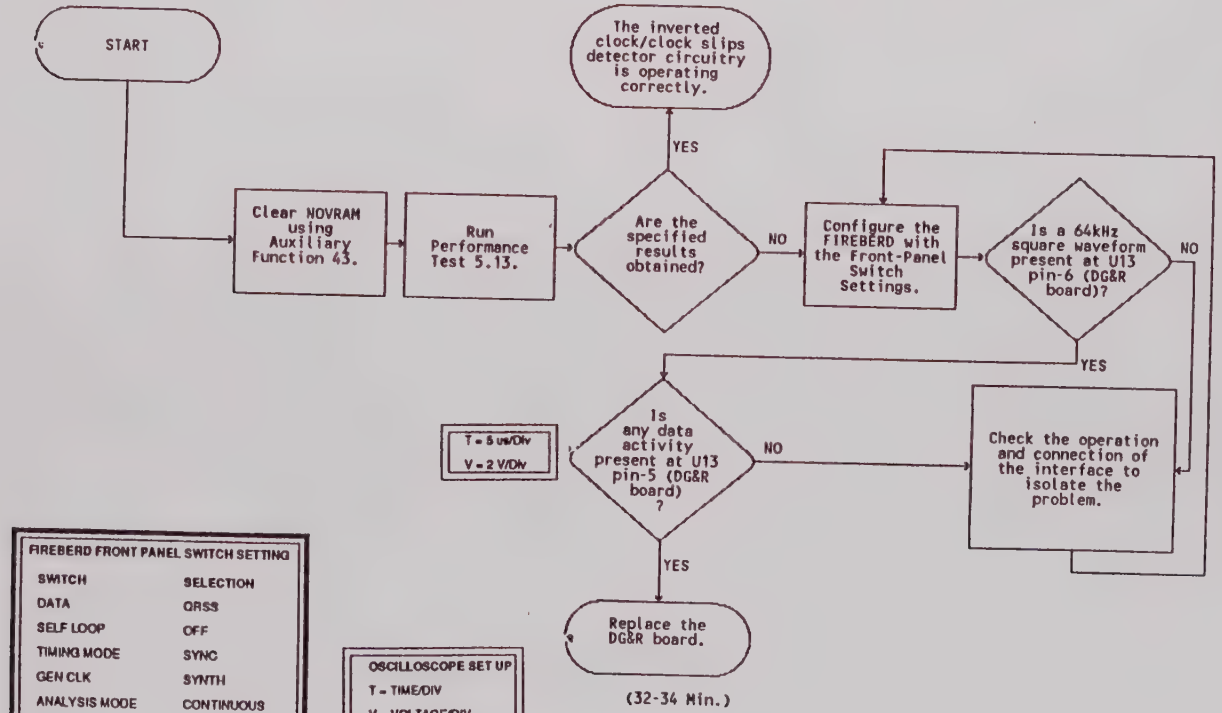

START
Run Performance Test 5.7.
Are the specified results obtained?
YES
NO
(15 Min.)
BPV circuitry is operating correctly.
Configure the FIREBERD with the Front-Panel Switch Settings.
Is a 14 kHz signal (4% duty cycle) present at U44 pin-6 (DG&R board)?
NO
YES
(28 Min.)
Replace the DG&R board.
Is a 1.544 MHz square-wave present at U9 pin-2 (DG&R board)?
YES
NO
Power OFF the FIREBERD. Verify that the Interface is properly inserted in the DG&R board.
Power OFF the FIREBERD. Verify that the DG&R and Processor boards are properly inserted in the Motherboard.
Is a 1.544 MHz square wave present at U31 pin-5 (Processor board)?
YES
NO
Is the RESULT BPV display count incrementing?
YES
NO
The external interface was not inserted properly.
Replace the external interface.
(26 Min.)
Refer to Troubleshooting Tree 7.17.
(48 Min.)

FIREBERD FRONT PANEL SWITCH SETTING	
SWITCH	SELECTION
SELF LOOP	ON
GEN CLK	SYNTH
MENU	INTF SETUP
Softkey	DS1/T1 (40540) or DS1/Fe (40460)
MORE key	Press
Softkey	ERRINS (40540) or BPVINS (40460)
Softkey	RATE
Softkey	9E-3
ANALYSIS CATEGORY	T-CARRIER
ANALYSIS RESULT	BPV

7.8 Troubleshooting Tree

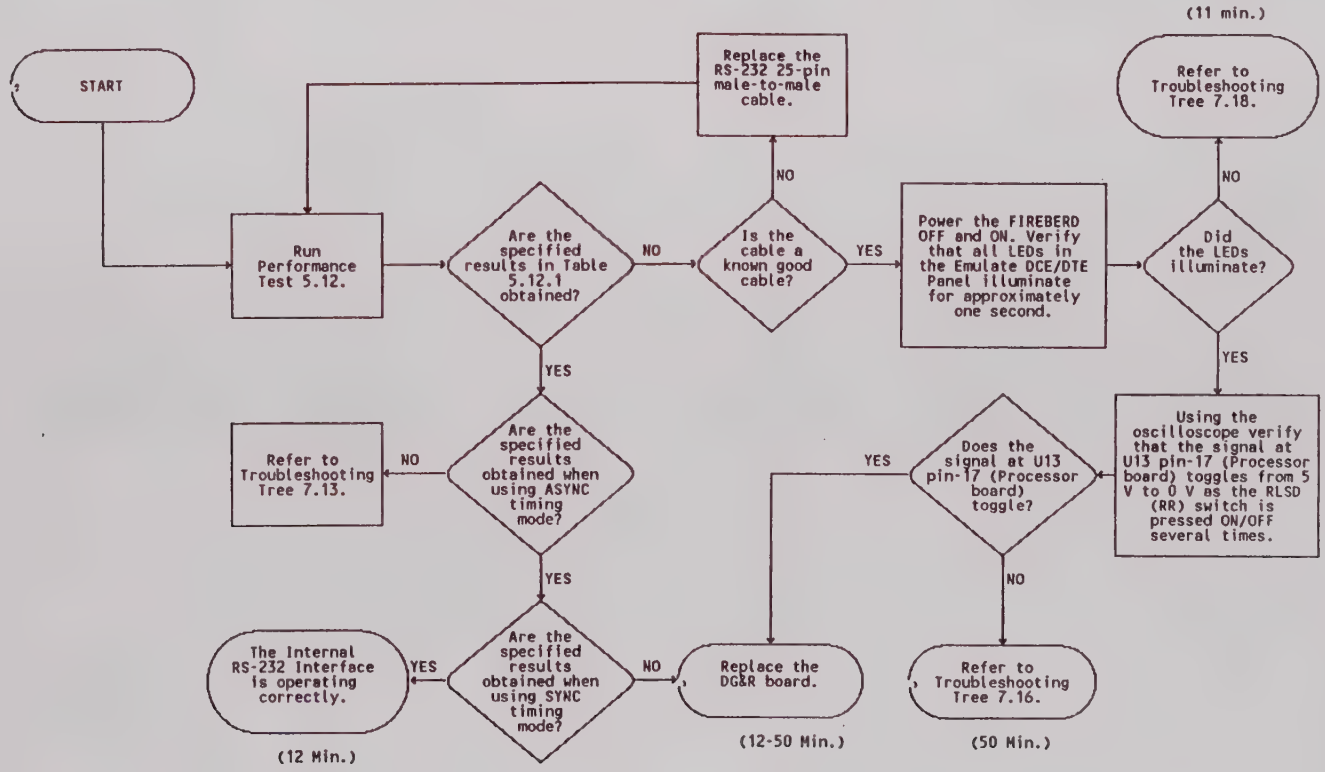
Clock Slip/Pattern Slip[1] Count circuitry is inoperable.

CLK INV indicator is not functioning.



7.9 Troubleshooting Tree

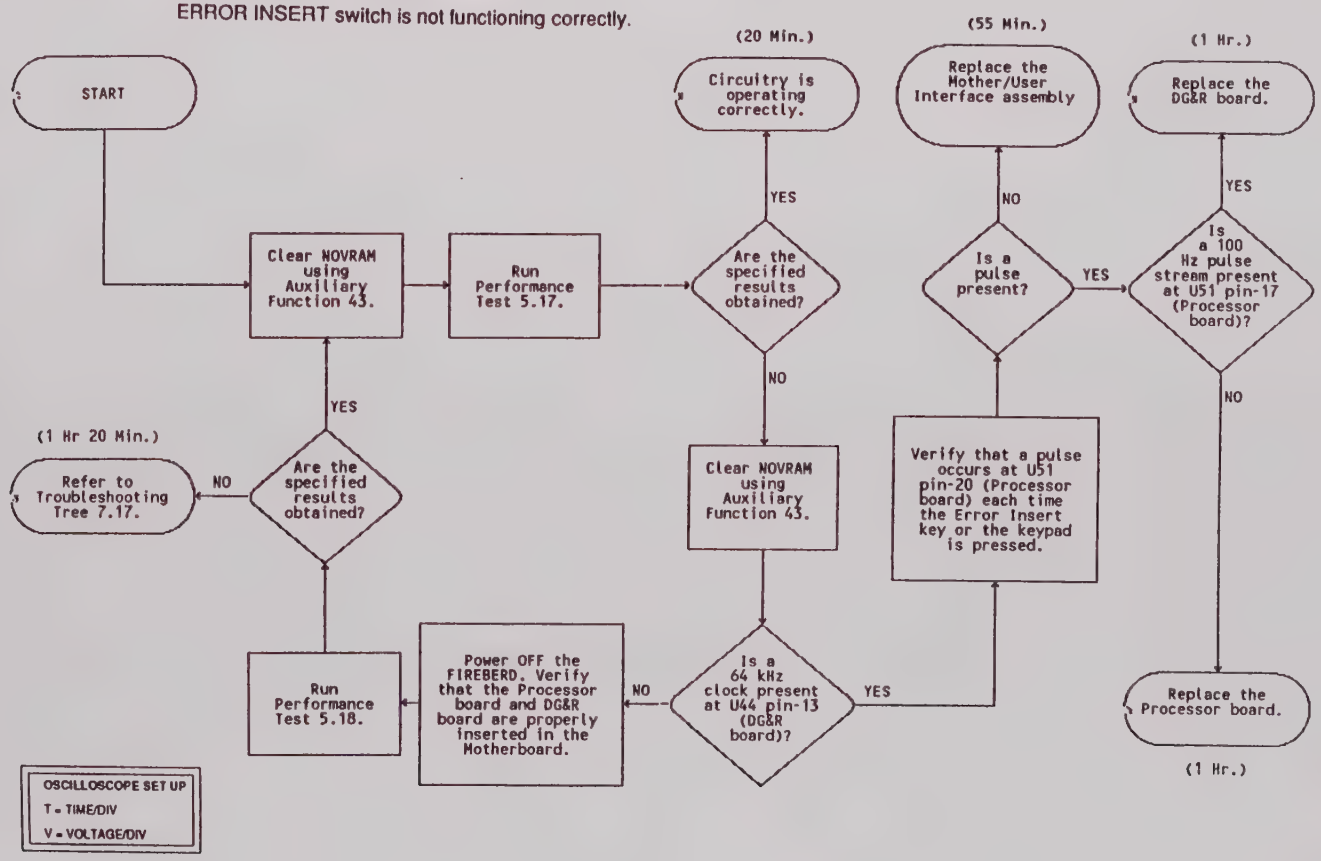
Data Transmission/Reception is inoperable when using the internal RS-232/V.24 Interface.


START
Run Performance Test 5.12.
Are the specified results in Table 5.12.1 obtained?
NO
Is the cable a known good cable?
NO
Replace the RS-232 25-pin male-to-male cable.
YES
Power the FIREBERD OFF and ON. Verify that all LEDs in the Emulate DCE/DTE Panel illuminate for approximately one second.
Did the LEDs illuminate?
NO
(11 min.)
Refer to Troubleshooting Tree 7.18.
YES
Using the oscilloscope verify that the signal at U13 pin-17 (Processor board) toggles from 5 V to 0 V as the RLSD (RR) switch is pressed ON/OFF several times.
Does the signal at U13 pin-17 (Processor board) toggle?
YES
NO
Refer to Troubleshooting Tree 7.16.
(50 Min.)
Replace the DG&R board.
(12-50 Min.)
YES
Are the specified results obtained when using SYNC timing mode?
NO
The Internal RS-232 Interface is operating correctly.
YES
(12 Min.)
YES
Are the specified results obtained when using ASYNC timing mode?
NO
Refer to Troubleshooting Tree 7.13.

7.10 Troubleshooting Tree

Data patterns are not programmable.

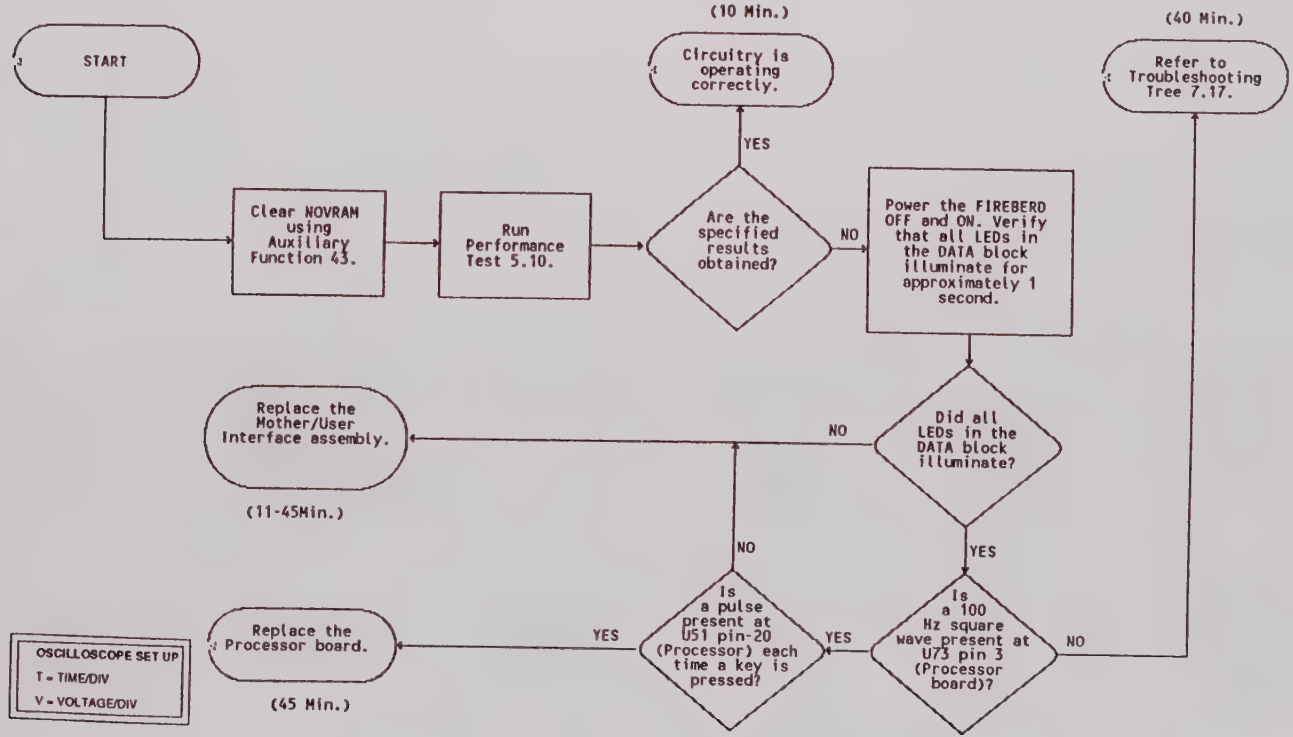
ERROR INSERT switch is not functioning correctly.


START
Clear NOVRAM using Auxiliary Function 43.
Run Performance Test 5.17.
Are the specified results obtained?
(20 Min.)
Circuitry is operating correctly.
YES
NO
Is a pulse present?
(55 Min.)
Replace the Mother/User Interface assembly
NO
YES
Is a 100 Hz pulse stream present at U51 pin-17 (Processor board)?
(1 Hr.)
Replace the DG&R board.
YES
NO
Replace the Processor board.
(1 Hr.)
Verify that a pulse occurs at U51 pin-20 (Processor board) each time the Error Insert key or the keypad is pressed.
Is a 64 kHz clock present at U44 pin-13 (DG&R board)?
YES
NO
Power OFF the FIREBERD. Verify that the Processor board and DG&R board are properly inserted in the Motherboard.
Run Performance Test 5.18.
Are the specified results obtained?
YES
NO
(1 Hr 20 Min.)
Refer to Troubleshooting Tree 7.17.
OSCILLOSCOPE SET UP
T = TIME/DIV
V = VOLTAGE/DIV

7.11 Troubleshooting Tree

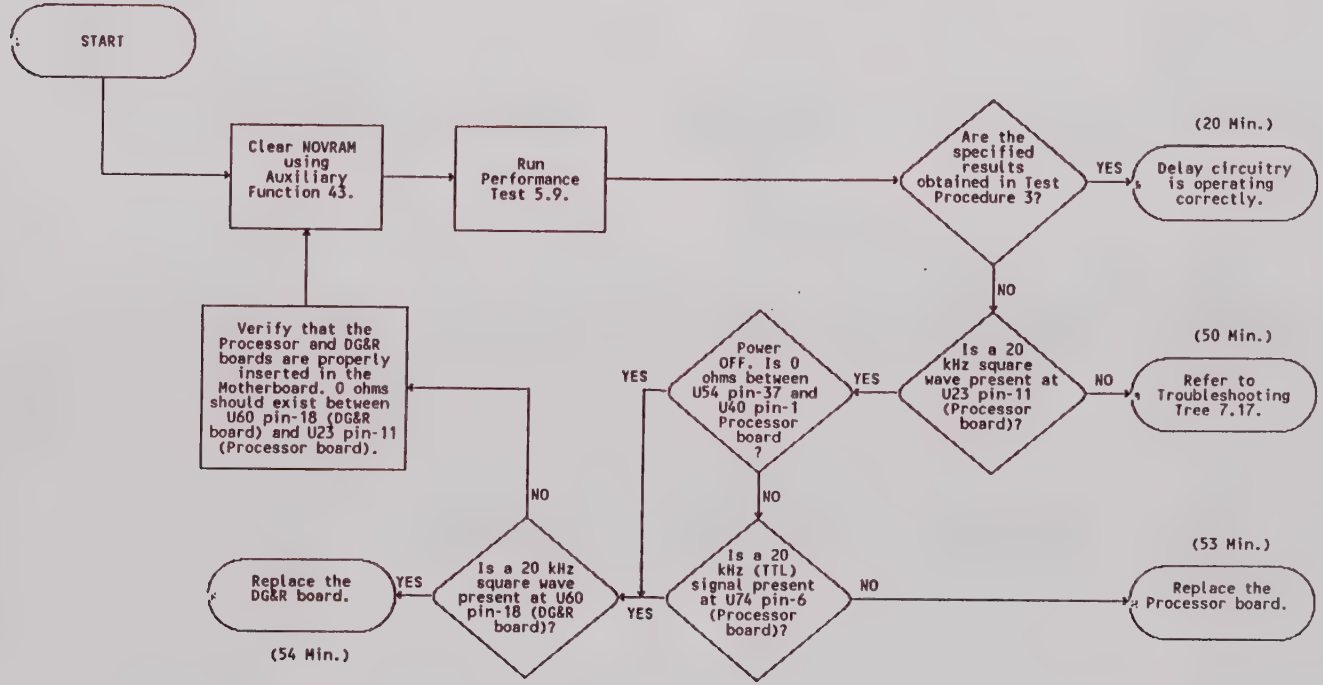
DATA pattern selection is not operating correctly.

The front-panel display is not operating correctly.


START
Clear NOVRAM using Auxiliary Function 43.
Run Performance Test 5.10.
Are the specified results obtained?
NO
YES
(10 Min.)
Circuitry is operating correctly.
Power the FIREBERD OFF and ON. Verify that all LEDs in the DATA block illuminate for approximately 1 second.
(40 Min.)
Refer to Troubleshooting Tree 7.17.
Did all LEDs in the DATA block illuminate?
NO
YES
Replace the Mother/User Interface assembly.
(11-45Min.)
Is a 100 Hz square wave present at U73 pin 3 (Processor board)?
YES
NO
Is a pulse present at U51 pin-20 (Processor) each time a key is pressed?
YES
NO
Replace the Processor board.
(45 Min.)
OSCILLOSCOPE SET UP
T = TIME/DIV
V = VOLTAGE/DIV

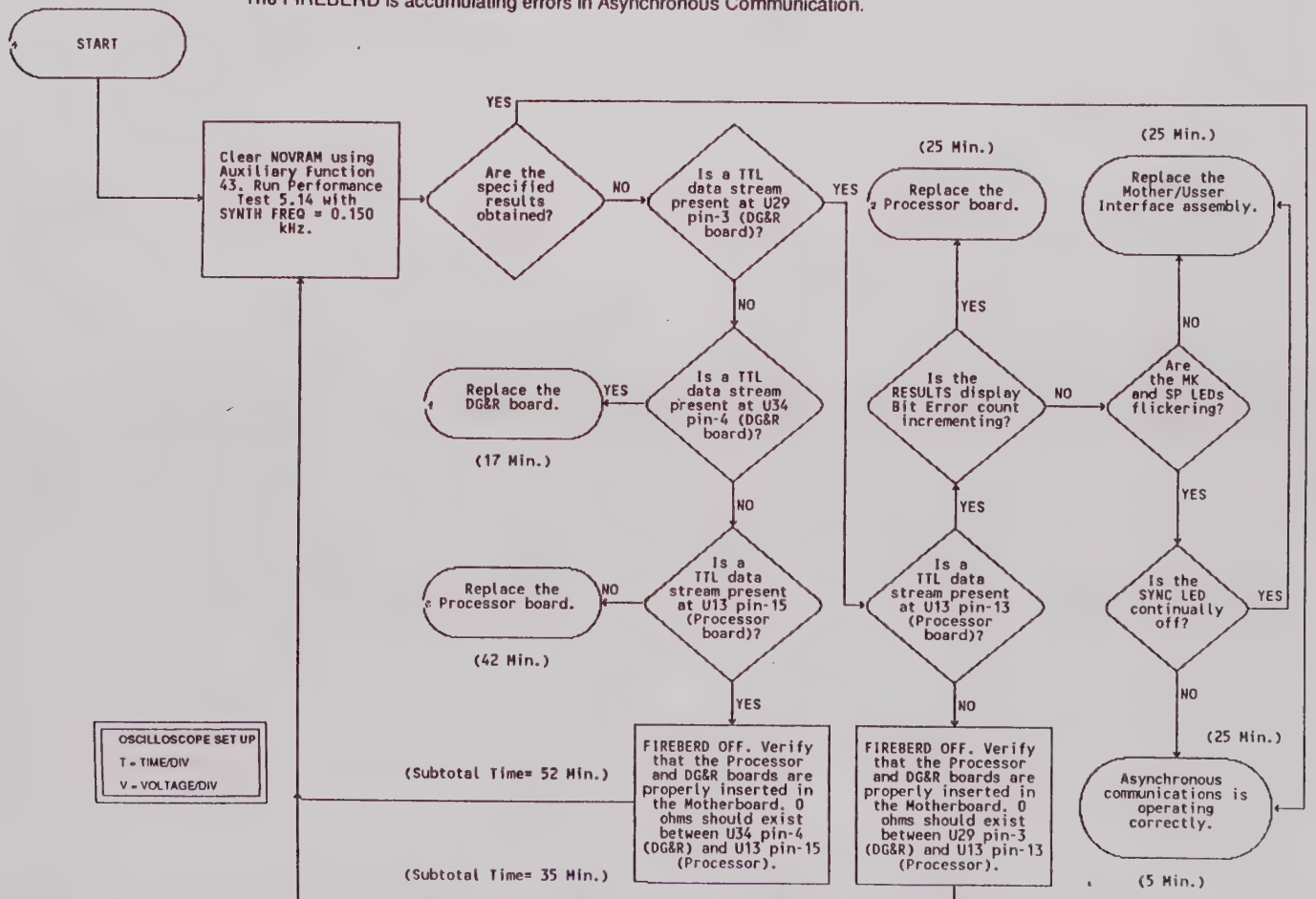
7.12 Troubleshooting Tree

Delay measurements are unavailable or they are inaccurate.


START
Clear NOVRAM using Auxiliary Function 43.
Run Performance Test 5.9.
Are the specified results obtained in Test Procedure 3?
YES
(20 Min.)
Delay circuitry is operating correctly.
NO
Verify that the Processor and DG&R boards are properly inserted in the Motherboard. 0 ohms should exist between U60 pin-18 (DG&R board) and U23 pin-11 (Processor board).
Power OFF. Is 0 ohms between U54 pin-37 and U40 pin-1 Processor board ?
YES
Is a 20 kHz square wave present at U23 pin-11 (Processor board)?
YES
NO
(50 Min.)
Refer to Troubleshooting Tree 7.17.
NO
NO
Replace the DG&R board.
YES
Is a 20 kHz square wave present at U60 pin-18 (DG&R board)?
YES
Is a 20 kHz (TTL) signal present at U74 pin-6 (Processor board)?
NO
(53 Min.)
Replace the Processor board.
(54 Min.)

7.13 Troubleshooting Tree

The FIREBERD is accumulating errors in Asynchronous Communication.

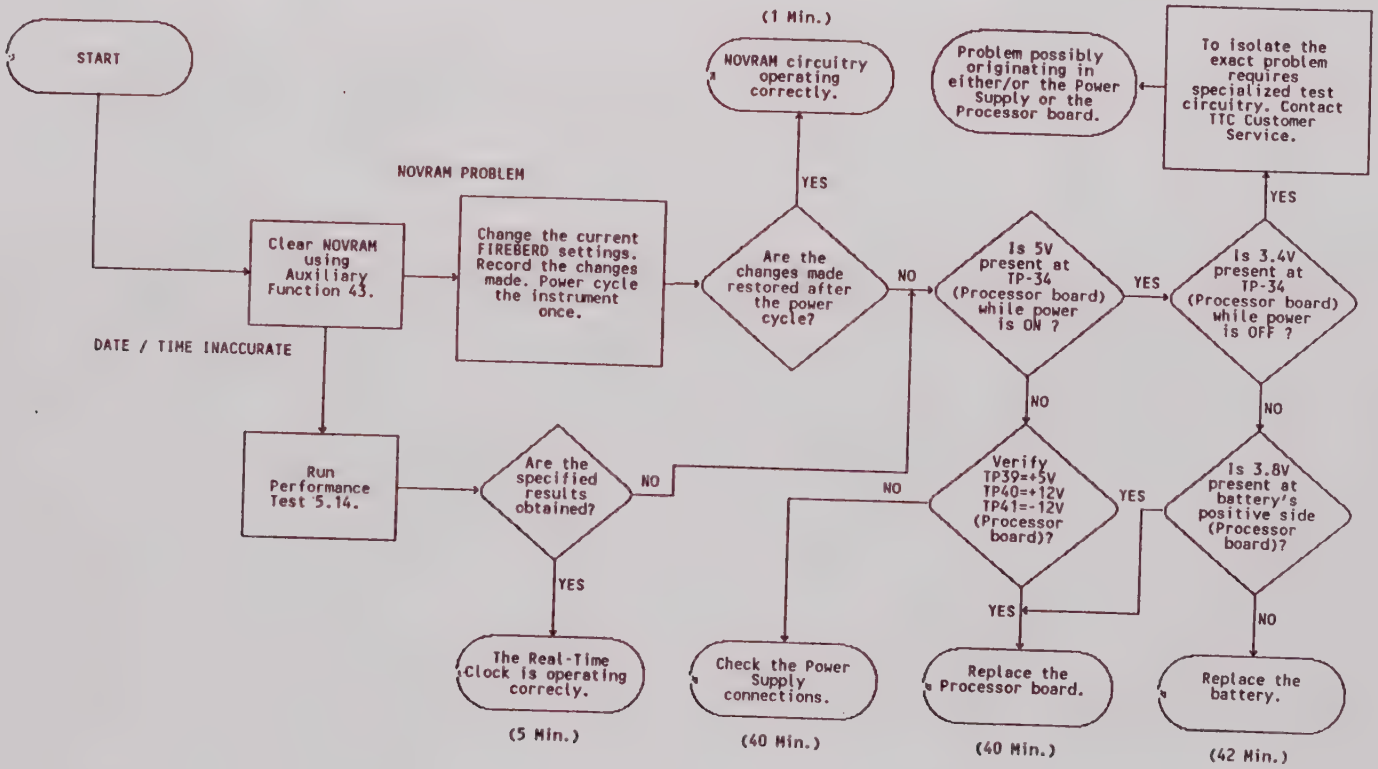

START
Clear NOVRAM using Auxiliary Function 43. Run Performance Test 5.14 with SYNTH FREQ = 0.150 kHz.
Are the specified results obtained?
YES
NO
Is a TTL data stream present at U29 pin-3 (DG&R board)?
YES
NO
(25 Min.)
Replace the Processor board.
(25 Min.)
Replace the Mother/Usser Interface assembly.
Is the RESULTS display Bit Error count incrementing?
YES
NO
Are the MK and SP LEDs flickering?
YES
NO
Replace the DG&R board.
YES
(17 Min.)
Is a TTL data stream present at U34 pin-4 (DG&R board)?
NO
Is a TTL data stream present at U13 pin-13 (Processor board)?
YES
NO
Is the SYNC LED continually off?
YES
NO
Replace the Processor board.
NO
(42 Min.)
Is a TTL data stream present at U13 pin-15 (Processor board)?
YES
NO
(25 Min.)
OSCILLOSCOPE SET UP
T = TIME/DIV
V = VOLTAGE/DIV
(Subtotal Time= 52 Min.)
FIREBERD OFF. Verify that the Processor and DG&R boards are properly inserted in the Motherboard. 0 ohms should exist between U34 pin-4 (DG&R) and U13 pin-15 (Processor).
FIREBERD OFF. Verify that the Processor and DG&R boards are properly inserted in the Motherboard. 0 ohms should exist between U29 pin-3 (DG&R) and U13 pin-13 (Processor).
Asynchronous communications is operating correctly.
(Subtotal Time= 35 Min.)
(5 Min.)

7.14 Troubleshooting Tree

NOVRAM LOSS message displayed when the FIREBERD is powered ON.

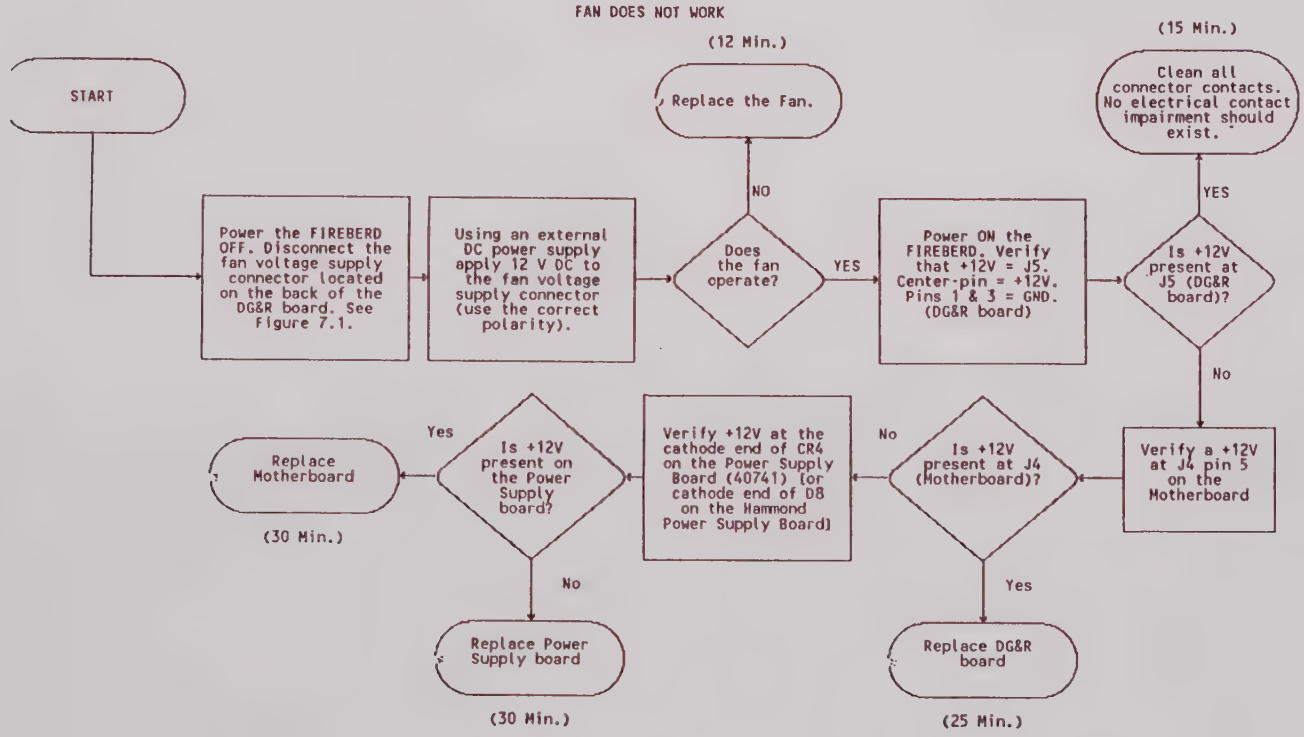
FIREBERD does not retain the front-panel switch settings from a previous power-cycle.

Date and Time are inaccurate.


START
NOVRAM PROBLEM
Clear NOVRAM using Auxiliary Function 43.
Change the current FIREBERD settings. Record the changes made. Power cycle the instrument once.
Are the changes made restored after the power cycle?
YES
(1 Min.)
NOVRAM circuitry operating correctly.
NO
Is 5V present at TP-34 (Processor board) while power is ON ?
YES
Is 3.4V present at TP-34 (Processor board) while power is OFF ?
YES
To isolate the exact problem requires specialized test circuitry. Contact TTC Customer Service.
Problem possibly originating in either/or the Power Supply or the Processor board.
DATE / TIME INACCURATE
Run Performance Test 5.14.
Are the specified results obtained?
NO
YES
The Real-Time Clock is operating correcly.
(5 Min.)
Verify TP39=+5V TP40=+12V TP41=-12V (Processor board)?
NO
YES
Check the Power Supply connections.
(40 Min.)
Is 3.8V present at battery's positive side (Processor board)?
NO
YES
Replace the Processor board.
(40 Min.)
Replace the battery.
(42 Min.)

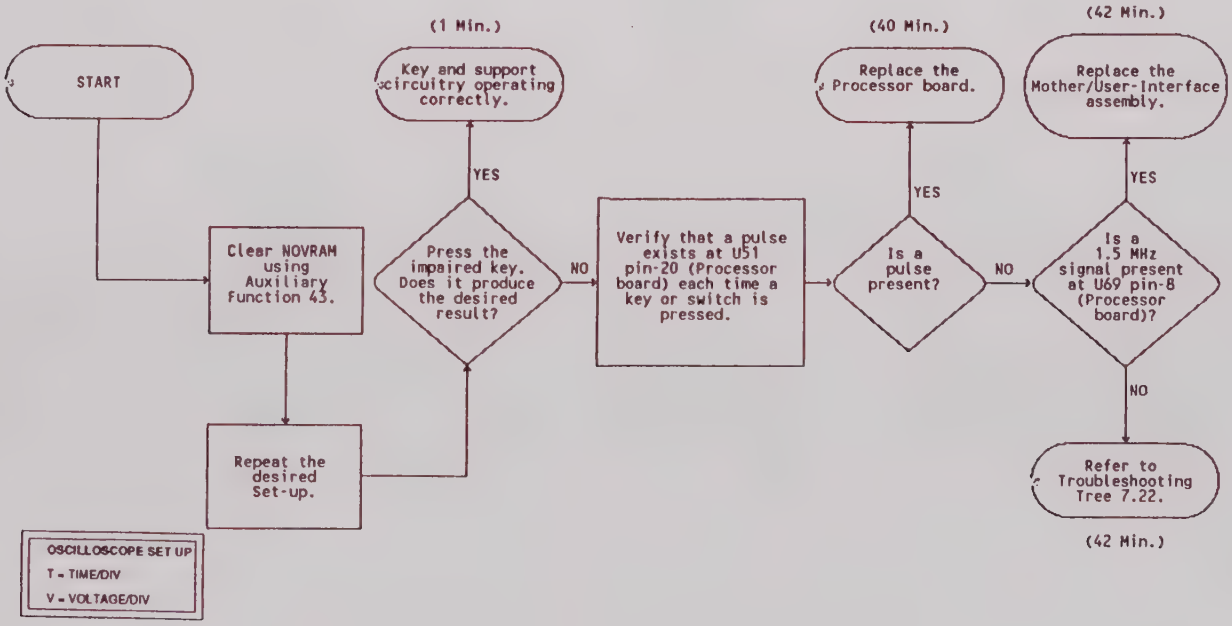
7.15 Troubleshooting Tree

Fan is not operating correctly.


FAN DOES NOT WORK
START
Power the FIREBERD OFF. Disconnect the fan voltage supply connector located on the back of the DG&R board. See Figure 7.1.
Using an external DC power supply apply 12 V DC to the fan voltage supply connector (use the correct polarity).
Does the fan operate?
NO
(12 Min.)
Replace the Fan.
YES
Power ON the FIREBERD. Verify that +12V = J5. Center-pin = +12V. Pins 1 & 3 = GND. (DG&R board)
Is +12V present at J5 (DG&R board)?
YES
(15 Min.)
Clean all connector contacts. No electrical contact impairment should exist.
No
Verify a +12V at J4 pin 5 on the Motherboard
Is +12V present at J4 (Motherboard)?
No
Yes
Replace DG&R board
(25 Min.)
Verify +12V at the cathode end of CR4 on the Power Supply Board (40741) [or cathode end of D8 on the Hammond Power Supply Board]
Is +12V present on the Power Supply board?
Yes
Replace Motherboard
(30 Min.)
No
Replace Power Supply board
(30 Min.)

7.16 Troubleshooting Tree

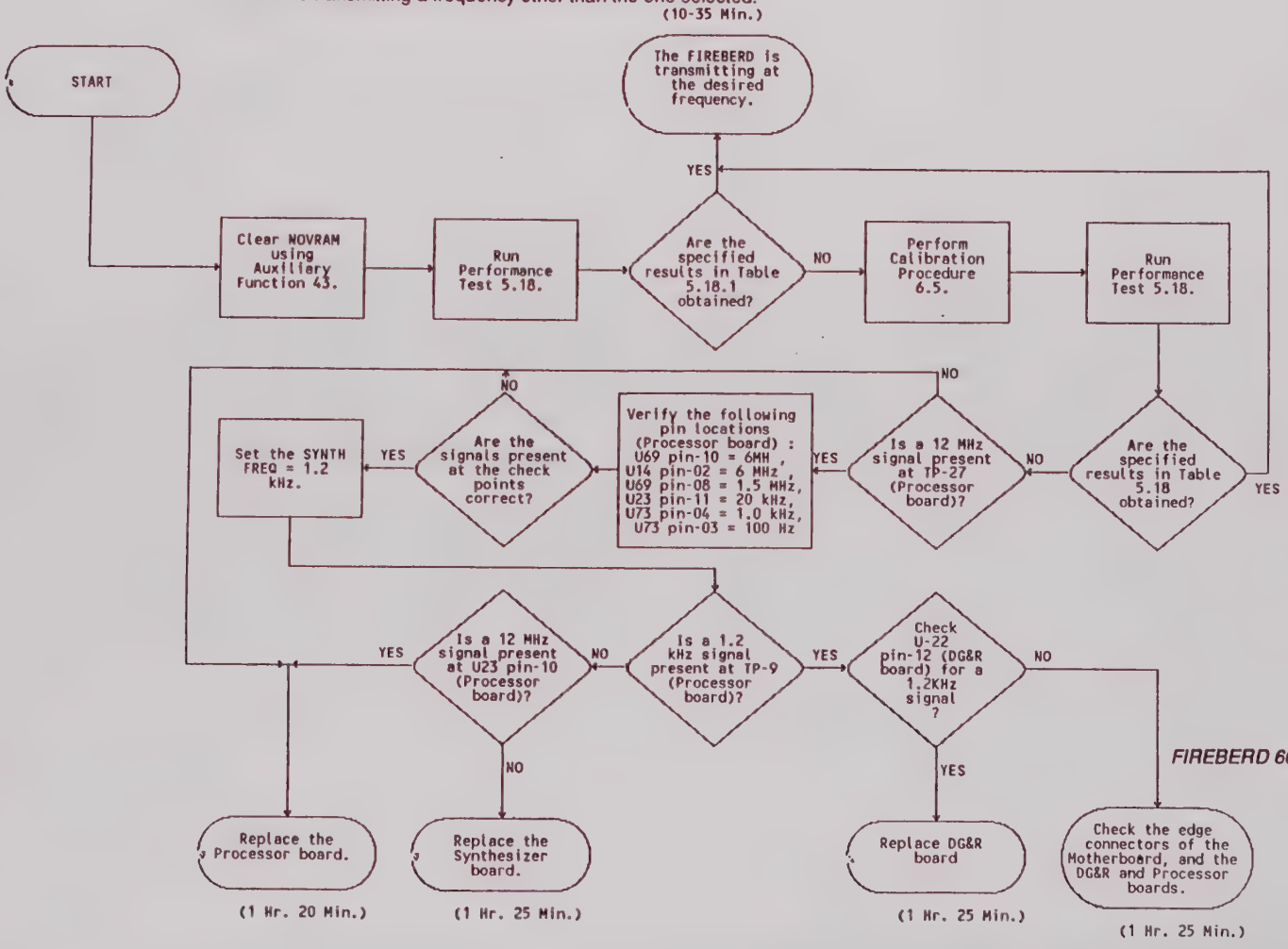
Front-panel switches and keys are not operating correctly.


START
Clear NOVRAM using Auxiliary Function 43.
Repeat the desired Set-up.
(1 Min.)
Key and support circuitry operating correctly.
YES
Press the impaired key. Does it produce the desired result?
NO
Verify that a pulse exists at U51 pin-20 (Processor board) each time a key or switch is pressed.
(40 Min.)
Replace the Processor board.
YES
Is a pulse present?
NO
(42 Min.)
Replace the Mother/User-Interface assembly.
YES
Is a 1.5 MHz signal present at U69 pin-8 (Processor board)?
NO
Refer to Troubleshooting Tree 7.22.
(42 Min.)
OSCILLOSCOPE SET UP
T = TIME/DIV
V = VOLTAGE/DIV

7.17 Troubleshooting Tree

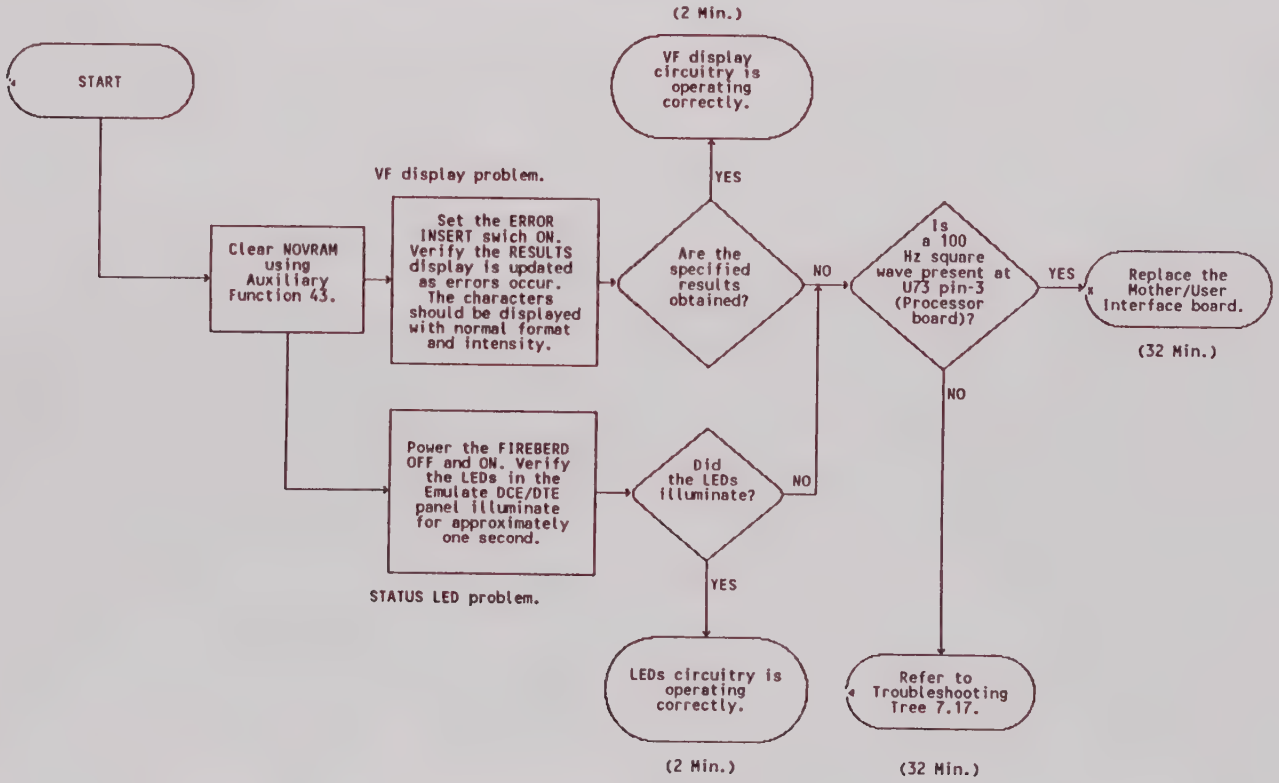
FIREBERD is not synchronizing correctly.

FIREBERD is transmitting a frequency other than the one selected.


(10-35 Min.)
START
The FIREBERD is transmitting at the desired frequency.
YES
Clear NOVRAM using Auxiliary Function 43.
Run Performance Test 5.18.
Are the specified results in Table 5.18.1 obtained?
NO
Perform Calibration Procedure 6.5.
Run Performance Test 5.18.
NO
Are the specified results in Table 5.18 obtained?
YES
NO
Is a 12 MHz signal present at TP-27 (Processor board)?
YES
Verify the following pin locations (Processor board) : U69 pin-10 = 6MH , U14 pin-02 = 6 MHz , U69 pin-08 = 1.5 MHz, U23 pin-11 = 20 kHz, U73 pin-04 = 1.0 kHz, U73 pin-03 = 100 Hz
NO
Are the signals present at the check points correct?
YES
Set the SYNTH FREQ = 1.2 kHz.
Is a 1.2 kHz signal present at TP-9 (Processor board)?
YES
Check U-22 pin-12 (DG&R board) for a 1.2KHz signal ?
NO
YES
Is a 12 MHz signal present at U23 pin-10 (Processor board)?
YES
NO
NO
YES
Replace the Processor board.
(1 Hr. 20 Min.)
Replace the Synthesizer board.
(1 Hr. 25 Min.)
Replace DG&R board
(1 Hr. 25 Min.)
Check the edge connectors of the Motherboard, and the DG&R and Processor boards.
(1 Hr. 25 Min.)

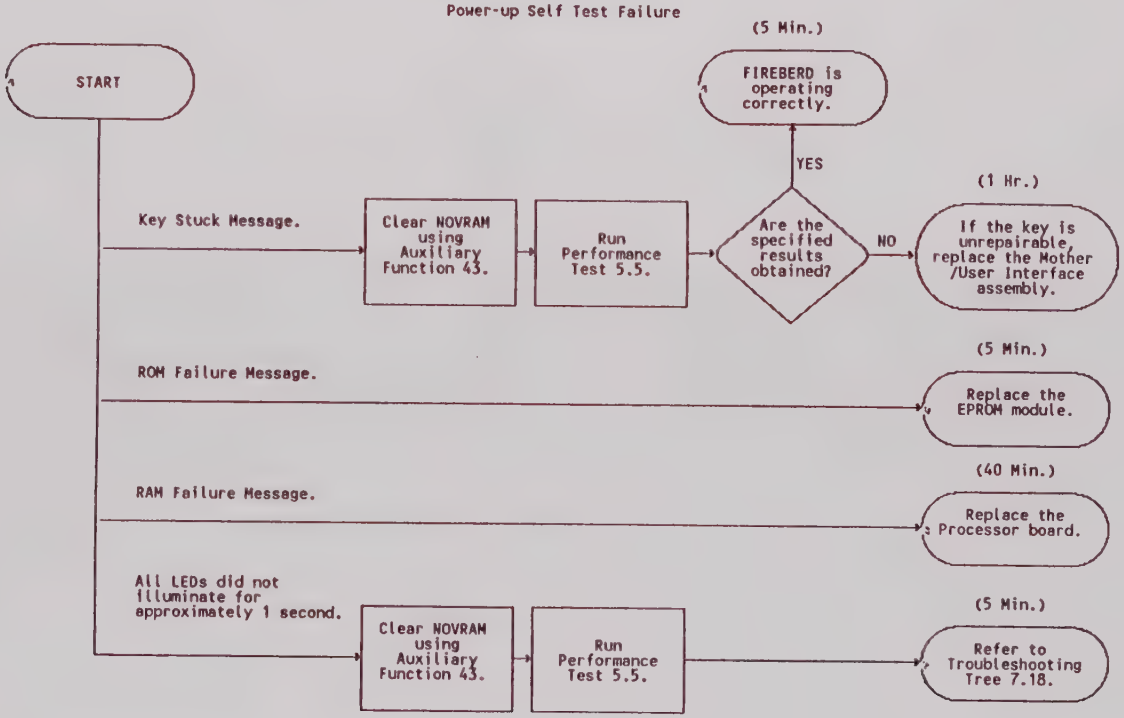
7.18 Troubleshooting Tree

Front-panel display is not functioning correctly.


START
Clear NOVRAM using Auxiliary Function 43.
VF display problem.
Set the ERROR INSERT swich ON. Verify the RESULTS display is updated as errors occur. The characters should be displayed with normal format and intensity.
Are the specified results obtained?
YES
(2 Min.)
VF display circuitry is operating correctly.
NO
Is a 100 Hz square wave present at U73 pin-3 (Processor board)?
YES
Replace the Mother/User Interface board.
(32 Min.)
NO
Refer to Troubleshooting Tree 7.17.
(32 Min.)
Power the FIREBERD OFF and ON. Verify the LEDs in the Emulate DCE/DTE panel illuminate for approximately one second.
STATUS LED problem.
Did the LEDs illuminate?
NO
YES
LEDs circuitry is operating correctly.
(2 Min.)

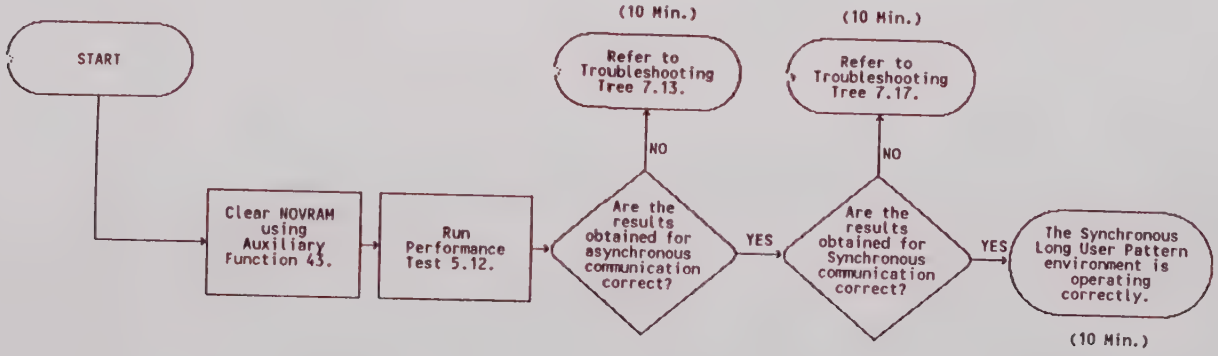
7.19 Troubleshooting Tree

A failure message is received when FIREBERD is powered ON.



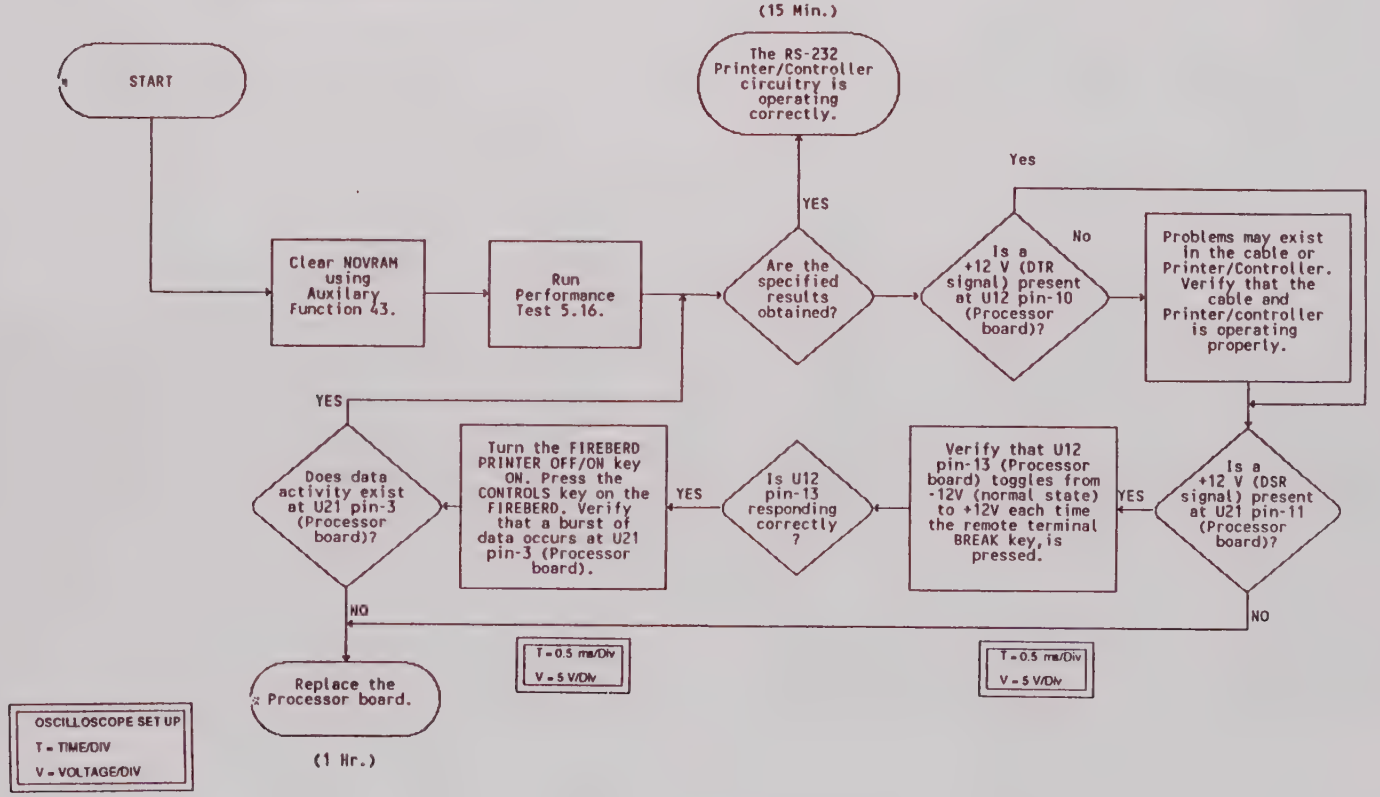
7.20 Troubleshooting Tree

Synchronous Long User Patterns is not available for use.



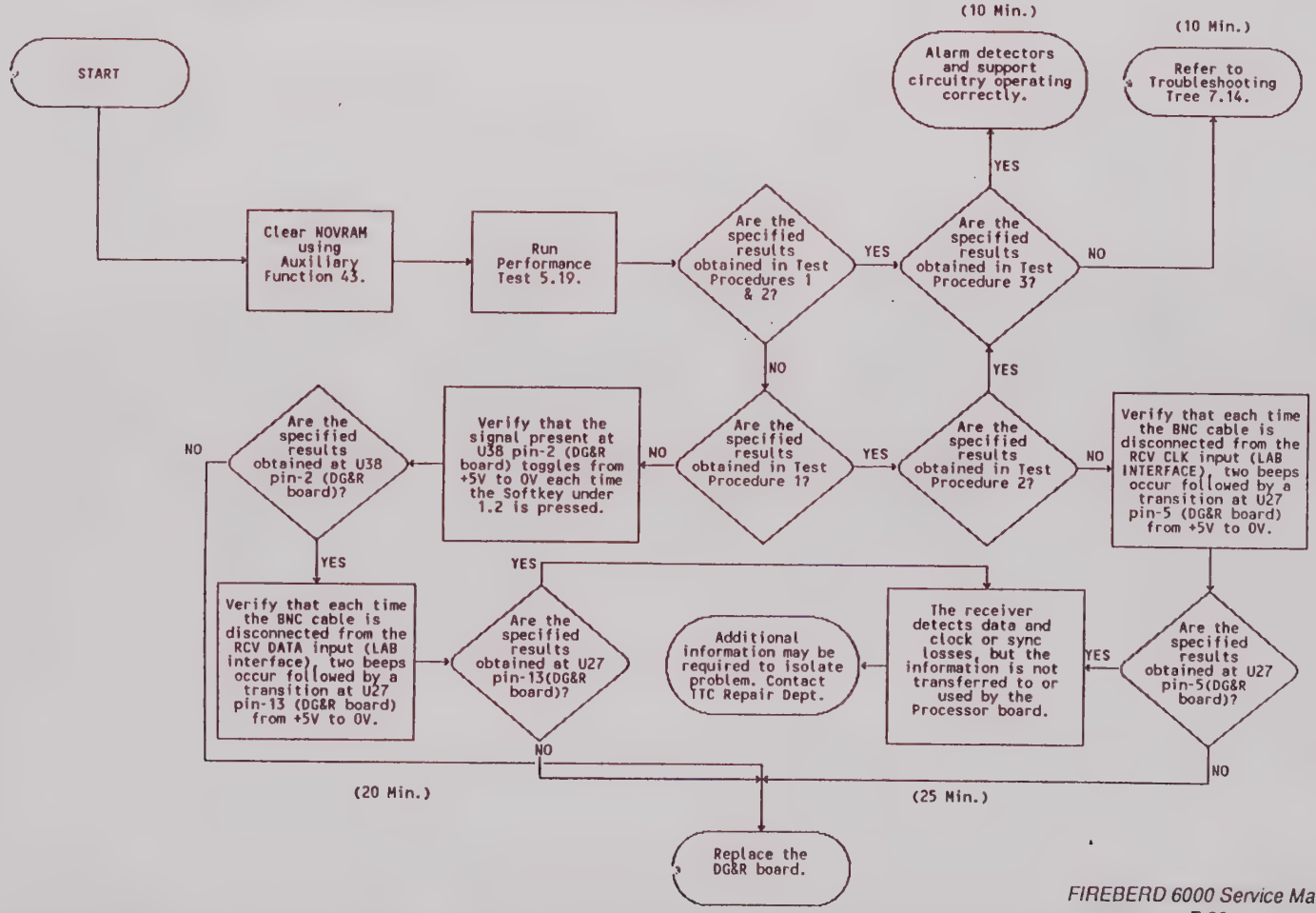
7.21 Troubleshooting Tree

FIREBERD is unable to print.


START
Clear NOVRAM using Auxilary Function 43.
Run Performance Test 5.16.
Are the specified results obtained?
YES
(15 Min.)
The RS-232 Printer/Controller circuitry is operating correctly.
Is a +12 V (DTR signal) present at U12 pin-10 (Processor board)?
No
Yes
Problems may exist in the cable or Printer/Controller. Verify that the cable and Printer/controller is operating properly.
Is a +12 V (DSR signal) present at U21 pin-11 (Processor board)?
YES
NO
Verify that U12 pin-13 (Processor board) toggles from -12V (normal state) to +12V each time the remote terminal BREAK key, is pressed.
T = 0.5 ms/Div
V = 5 V/Div
Is U12 pin-13 responding correctly ?
YES
Turn the FIREBERD PRINTER OFF/ON key ON. Press the CONTROLS key on the FIREBERD. Verify that a burst of data occurs at U21 pin-3 (Processor board).
T = 0.5 ms/Div
V = 5 V/Div
Does data activity exist at U21 pin-3 (Processor board)?
YES
NO
Replace the Processor board.
(1 Hr.)
OSCILLOSCOPE SET UP
T = TIME/DIV
V = VOLTAGE/DIV

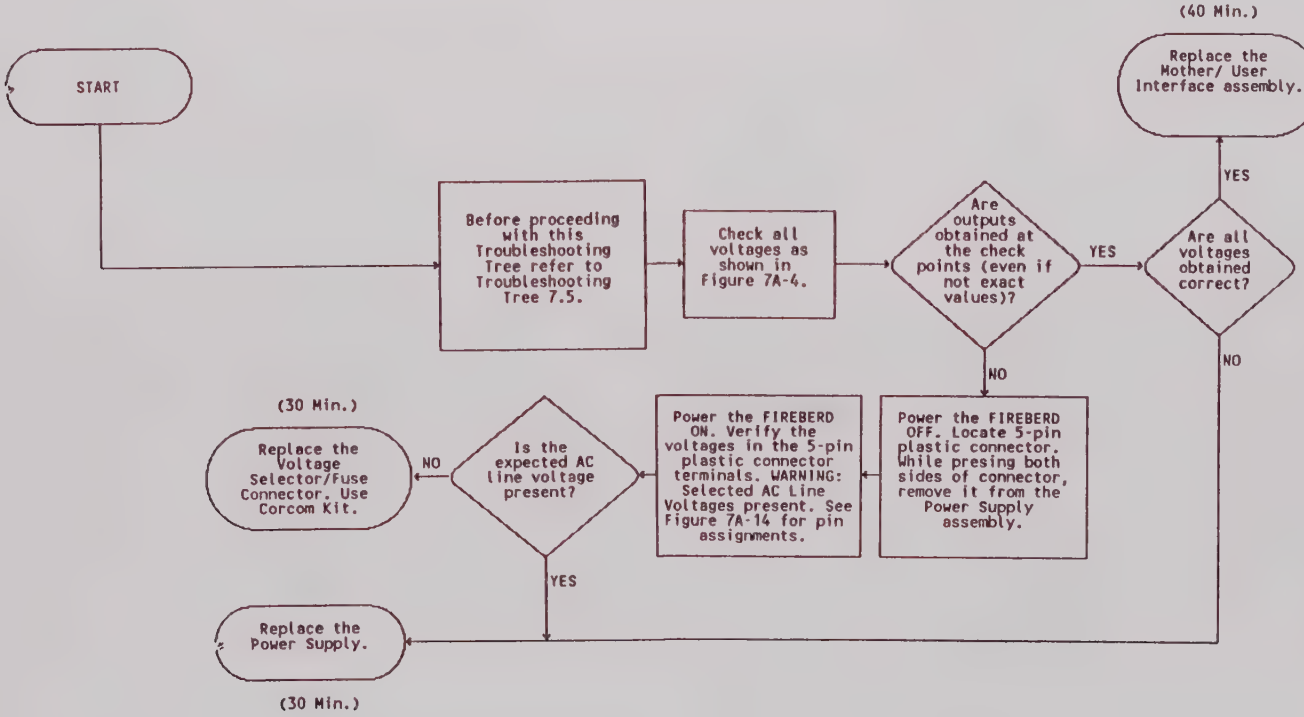
7.22 Troubleshooting Tree

Results from the ALARMS ANALYSIS CATEGORY are not available.

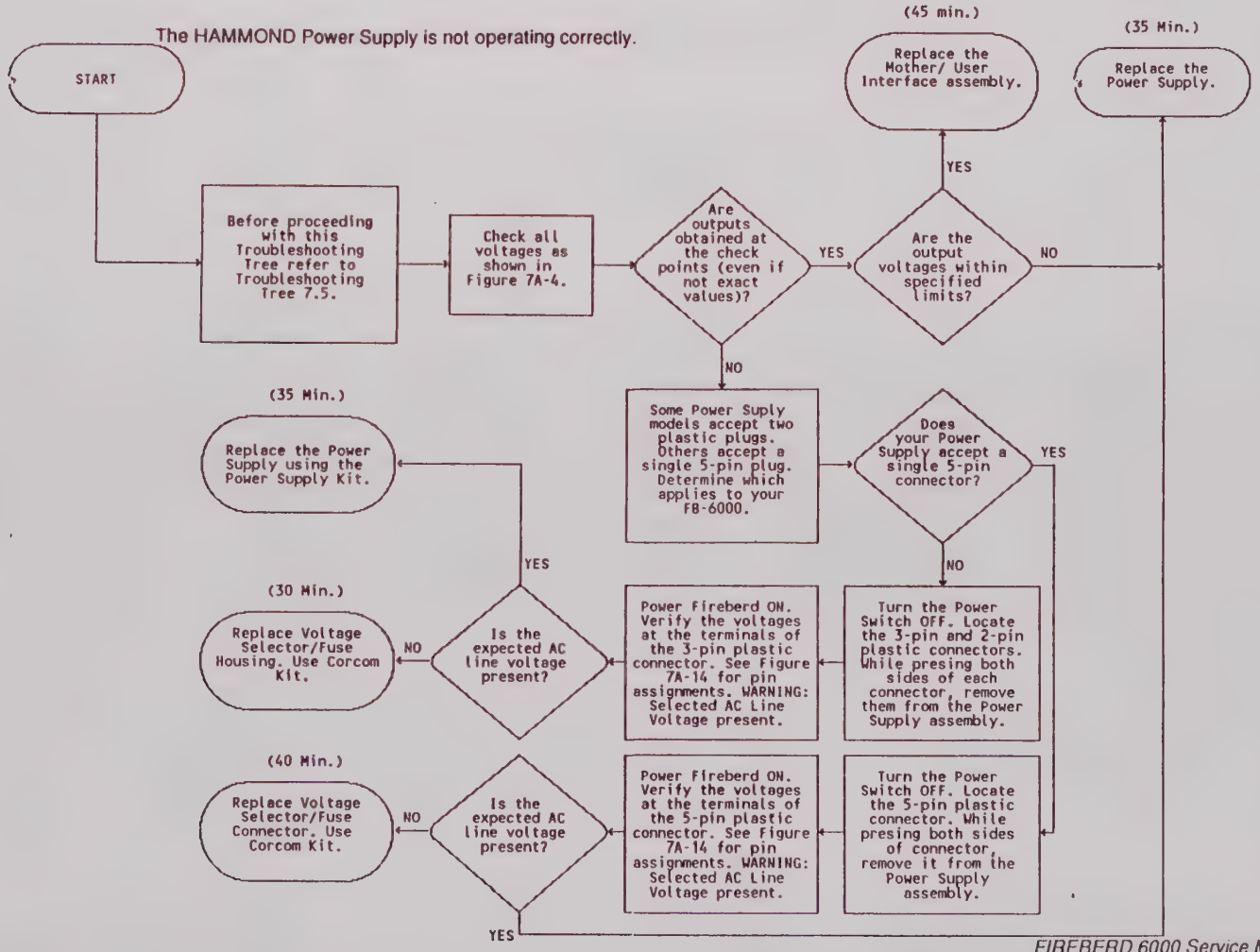

START
Clear NOVRAM using Auxiliary Function 43.
Run Performance Test 5.19.
Are the specified results obtained in Test Procedures 1 & 2?
YES
Are the specified results obtained in Test Procedure 3?
NO
(10 Min.)
Refer to Troubleshooting Tree 7.14.
YES
(10 Min.)
Alarm detectors and support circuitry operating correctly.
NO
Are the specified results obtained in Test Procedure 1?
NO
Verify that the signal present at U38 pin-2 (DG&R board) toggles from +5V to 0V each time the Softkey under 1.2 is pressed.
Are the specified results obtained at U38 pin-2 (DG&R board)?
NO
YES
Are the specified results obtained in Test Procedure 2?
YES
NO
Verify that each time the BNC cable is disconnected from the RCV CLK input (LAB INTERFACE), two beeps occur followed by a transition at U27 pin-5 (DG&R board) from +5V to 0V.
Are the specified results obtained at U27 pin-5(DG&R board)?
YES
NO
Verify that each time the BNC cable is disconnected from the RCV DATA input (LAB interface), two beeps occur followed by a transition at U27 pin-13 (DG&R board) from +5V to 0V.
Are the specified results obtained at U27 pin-13(DG&R board)?
YES
NO
Additional information may be required to isolate problem. Contact ITC Repair Dept.
The receiver detects data and clock or sync losses, but the information is not transferred to or used by the Processor board.
YES
(20 Min.)
(25 Min.)
Replace the DG&R board.

7.23 Troubleshooting Tree

Power Supply (40741) is not operating correctly.

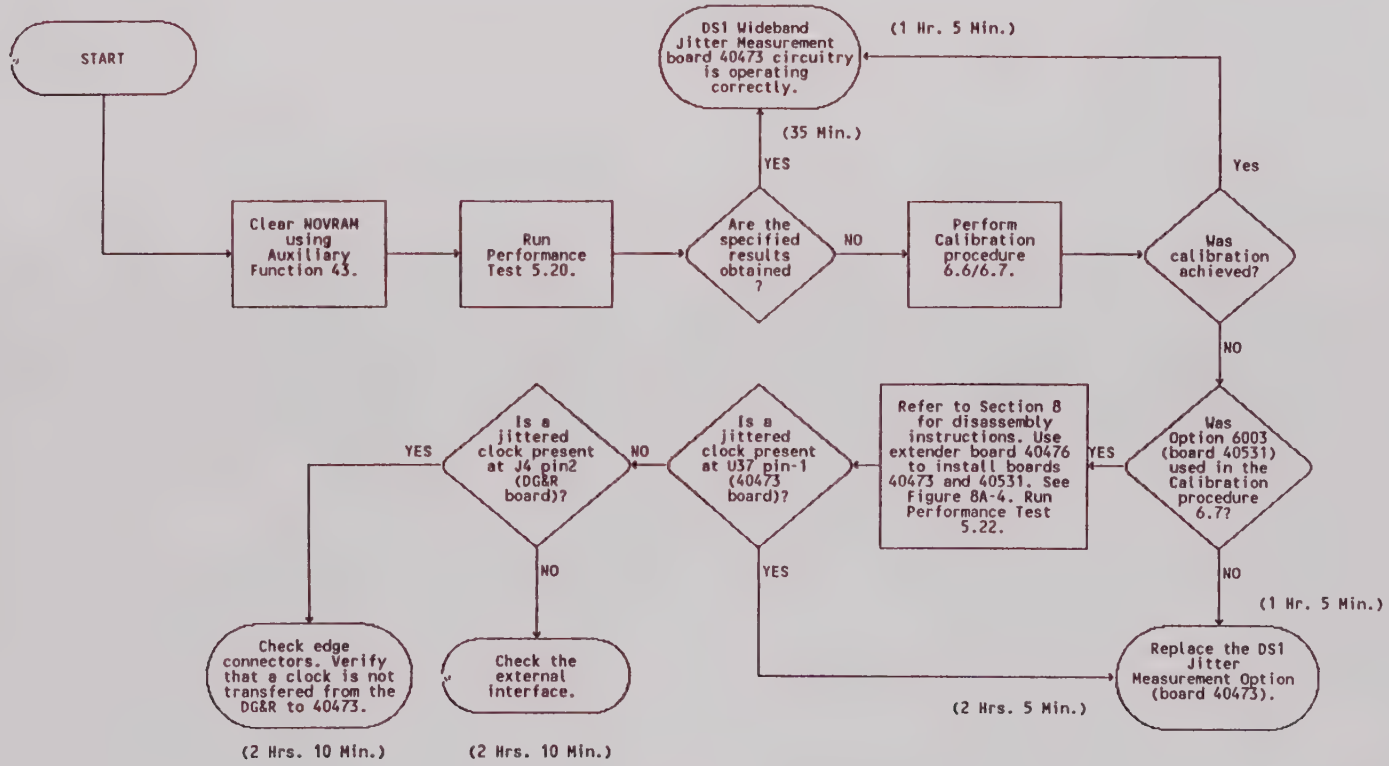

START
Before proceeding with this Troubleshooting Tree refer to Troubleshooting Tree 7.5.
Check all voltages as shown in Figure 7A-4.
Are outputs obtained at the check points (even if not exact values)?
YES
Are all voltages obtained correct?
YES
(40 Min.)
Replace the Mother/ User Interface assembly.
NO
NO
Power the FIREBERD OFF. Locate 5-pin plastic connector. While presing both sides of connector, remove it from the Power Supply assembly.
Power the FIREBERD ON. Verify the voltages in the 5-pin plastic connector terminals. WARNING: Selected AC Line Voltages present. See Figure 7A-14 for pin assignments.
Is the expected AC line voltage present?
NO
(30 Min.)
Replace the Voltage Selector/Fuse Connector. Use Corcom Kit.
YES
Replace the Power Supply.
(30 Min.)

7.24 Troubleshooting Tree


The HAMMOND Power Supply is not operating correctly.
START
Before proceeding with this Troubleshooting Tree refer to Troubleshooting Tree 7.5.
Check all voltages as shown in Figure 7A-4.
Are outputs obtained at the check points (even if not exact values)?
YES
Are the output voltages within specified limits?
NO
(45 min.)
Replace the Mother/ User Interface assembly.
YES
(35 Min.)
Replace the Power Supply.
NO
Some Power Suply models accept two plastic plugs. Others accept a single 5-pin plug. Determine which applies to your FB-6000.
Does your Power Supply accept a single 5-pin connector?
YES
NO
(35 Min.)
Replace the Power Supply using the Power Supply Kit.
YES
Turn the Power Switch OFF. Locate the 3-pin and 2-pin plastic connectors. While presing both sides of each connector, remove them from the Power Supply assembly.
Power Fireberd ON. Verify the voltages at the terminals of the 3-pin plastic connector. See Figure 7A-14 for pin assignments. WARNING: Selected AC Line Voltage present.
Is the expected AC line voltage present?
NO
(30 Min.)
Replace Voltage Selector/Fuse Housing. Use Corcom Kit.
Turn the Power Switch OFF. Locate the 5-pin plastic connector. While presing both sides of connector, remove it from the Power Supply assembly.
Power Fireberd ON. Verify the voltages at the terminals of the 5-pin plastic connector. See Figure 7A-14 for pin assignments. WARNING: Selected AC Line Voltage present.
Is the expected AC line voltage present?
NO
(40 Min.)
Replace Voltage Selector/Fuse Connector. Use Corcom Kit.
YES

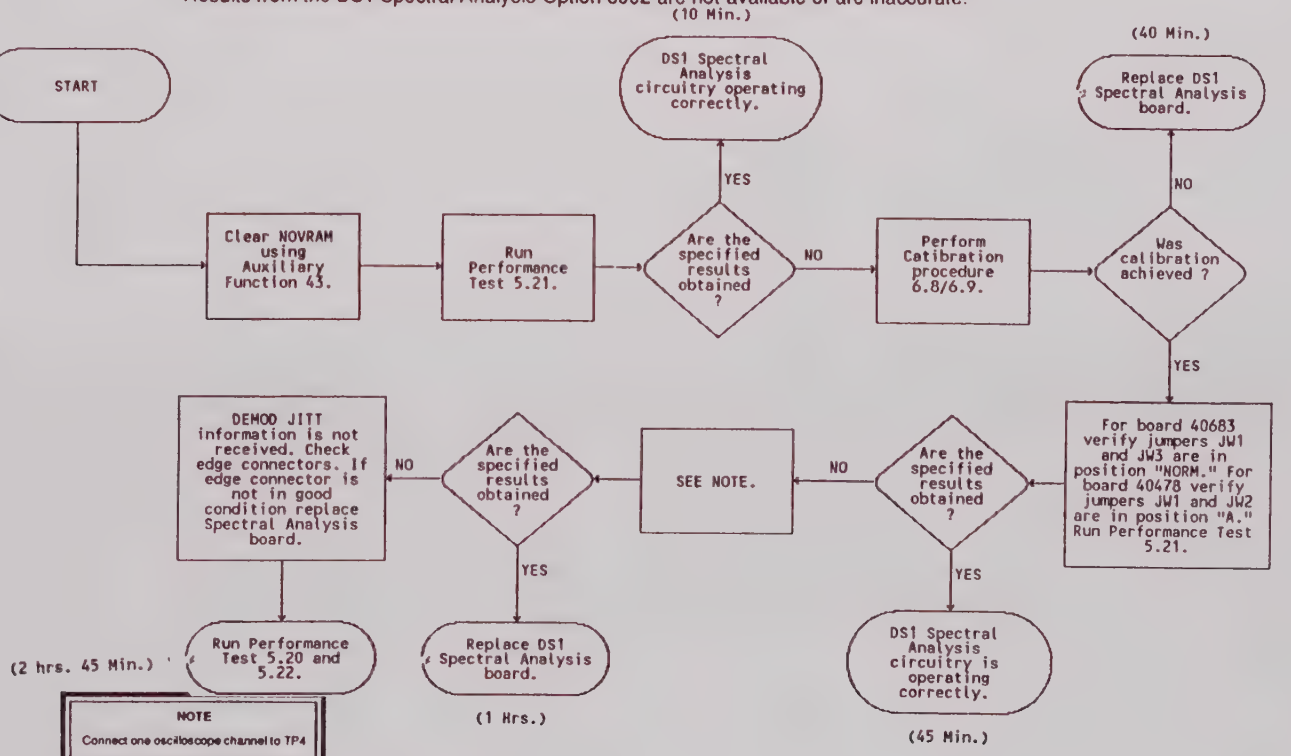
7.25 Troubleshooting Tree

The DS1 Jitter Wideband Jitter Measurement Option 6001 is not functioning correctly.


START
Clear NOVRAM using Auxiliary Function 43.
Run Performance Test 5.20.
Are the specified results obtained ?
YES
NO
DS1 Wideband Jitter Measurement board 40473 circuitry is operating correctly.
(35 Min.)
(1 Hr. 5 Min.)
Perform Calibration procedure 6.6/6.7.
Was calibration achieved?
Yes
NO
Was Option 6003 (board 40531) used in the Calibration procedure 6.7?
YES
Refer to Section 8 for disassembly instructions. Use extender board 40476 to install boards 40473 and 40531. See Figure 8A-4. Run Performance Test 5.22.
Is a jittered clock present at U37 pin-1 (40473 board)?
NO
YES
Is a jittered clock present at J4 pin2 (DG&R board)?
YES
NO
NO
(1 Hr. 5 Min.)
Replace the DS1 Jitter Measurement Option (board 40473).
(2 Hrs. 5 Min.)
Check edge connectors. Verify that a clock is not transfered from the DG&R to 40473.
(2 Hrs. 10 Min.)
Check the external interface.
(2 Hrs. 10 Min.)

7.26 Troubleshooting Tree

Results from the DS1 Spectral Analysis Option 6002 are not available or are inaccurate.

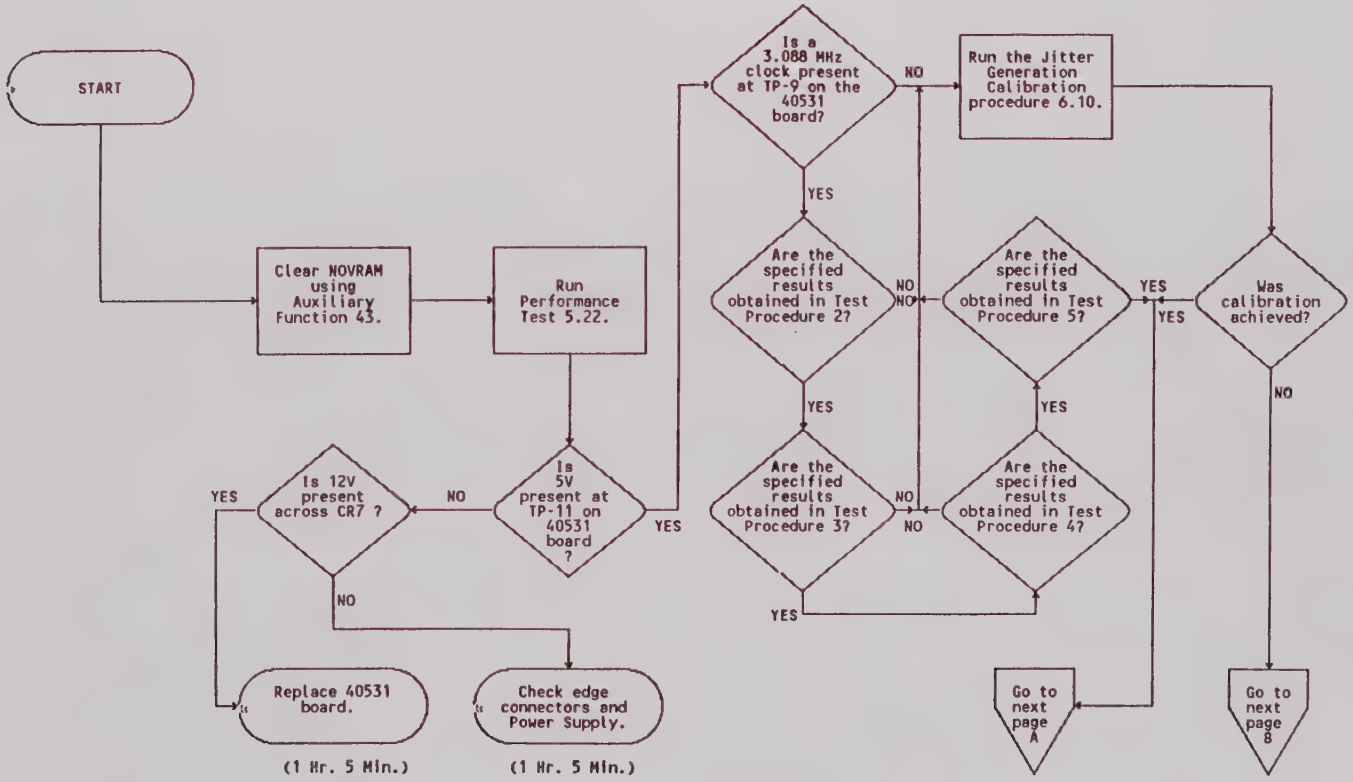

START
Clear NOVRAM using Auxiliary Function 43.
Run Performance Test 5.21.
Are the specified results obtained ?
NO
YES
(10 Min.)
DS1 Spectral Analysis circuitry operating correctly.
Perform Catibration procedure 6.8/6.9.
Was calibration achieved ?
NO
YES
(40 Min.)
Replace DS1 Spectral Analysis board.
For board 40683 verify jumpers JW1 and JW3 are in position "NORM." For board 40478 verify jumpers JW1 and JW2 are in position "A." Run Performance Test 5.21.
Are the specified results obtained ?
NO
YES
(45 Min.)
DS1 Spectral Analysis circuitry is operating correctly.
SEE NOTE.
Are the specified results obtained ?
NO
YES
(1 Hrs.)
Replace DS1 Spectral Analysis board.
DEMOD JITT information is not received. Check edge connectors. If edge connector is not in good condition replace Spectral Analysis board.
Run Performance Test 5.20 and 5.22.
(2 hrs. 45 Min.)

NOTE

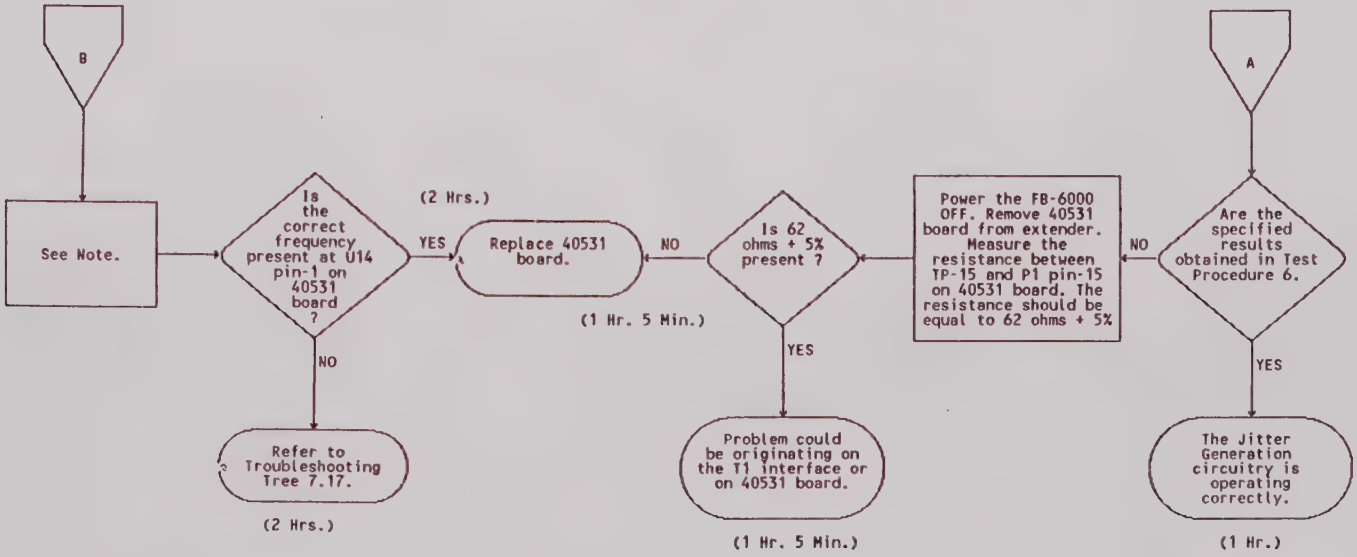
Connect one oscilloscope channel to TP4 (40683). Run Performance Test 5.21 Test Set-Up. Press the RESTART button. The oscilloscope screen should display a sine wave which changes frequency every two seconds. As the frequency sweeps 10 Hz to 100 kHz the amplitude decreases. The sweep takes approximately 120 seconds.

7.27 Troubleshooting Tree

The DS1 Jitter Generation Option 6003 is not functioning correctly.



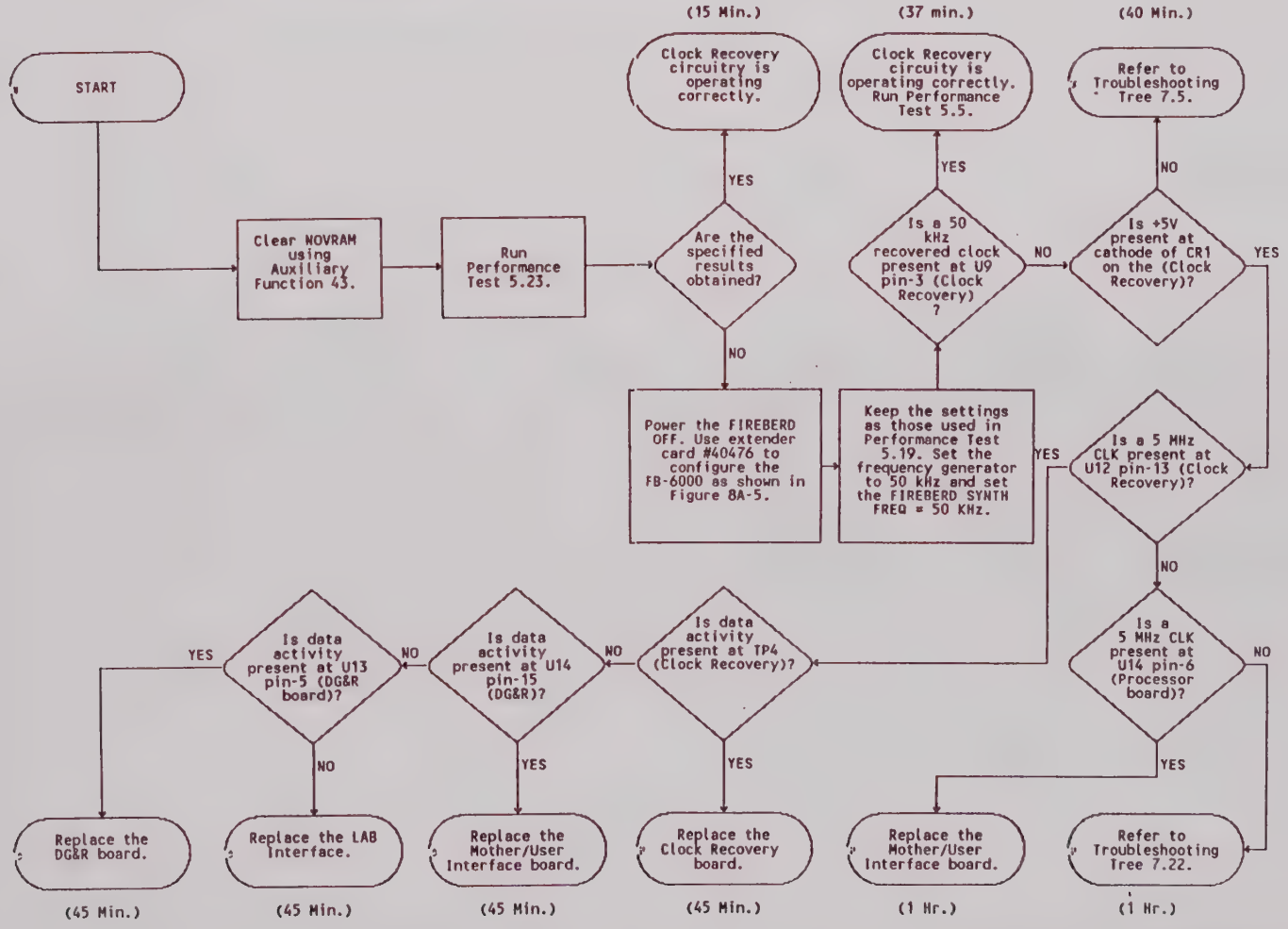
7.27 Troubleshooting Tree (continued)


B
See Note.
Is the correct frequency present at U14 pin-1 on 40531 board ?
YES
(2 Hrs.)
Replace 40531 board.
(1 Hr. 5 Min.)
NO
Refer to Troubleshooting Tree 7.17.
(2 Hrs.)
Is 62 ohms + 5% present ?
NO
YES
Problem could be originating on the T1 interface or on 40531 board.
(1 Hr. 5 Min.)
Power the FB-6000 OFF. Remove 40531 board from extender. Measure the resistance between TP-15 and P1 pin-15 on 40531 board. The resistance should be equal to 62 ohms + 5%
A
Are the specified results obtained in Test Procedure 6.
NO
YES
The Jitter Generation circuitry is operating correctly.
(1 Hr.)

NOTE

A clock is present at U14 pin-1 when a MOD frequency (F) is selected. The clock frequency is dependent on the value of the MOD frequency. If F is between 10 Hz and 10 kHz the clock frequency should equal F times 256. If F is between 10 kHz and 40 kHz the clock frequency should equal F times 32.

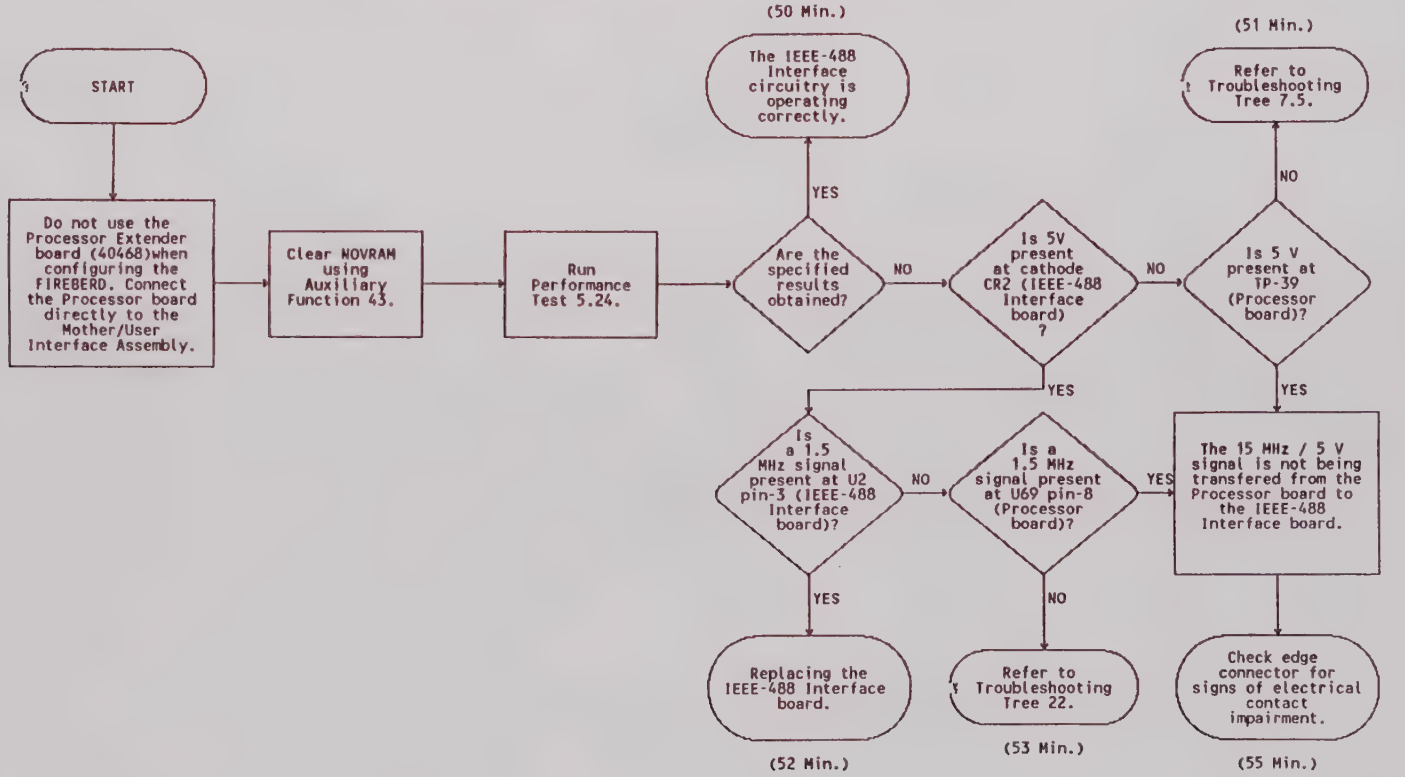
7.28 Troubleshooting Tree


START
Clear NOVRAM using Auxiliary Function 43.
Run Performance Test 5.23.
Are the specified results obtained?
YES
NO
(15 Min.)
Clock Recovery circuitry is operating correctly.
Power the FIREBERD OFF. Use extender card #40476 to configure the FB-6000 as shown in Figure 8A-5.
Keep the settings as those used in Performance Test 5.19. Set the frequency generator to 50 kHz and set the FIREBERD SYNTH FREQ = 50 KHz.
(37 min.)
Clock Recovery circuity is operating correctly. Run Performance Test 5.5.
Is a 50 kHz recovered clock present at U9 pin-3 (Clock Recovery) ?
(40 Min.)
Refer to Troubleshooting Tree 7.5.
Is +5V present at cathode of CR1 on the (Clock Recovery)?
Is a 5 MHz CLK present at U12 pin-13 (Clock Recovery)?
Is a 5 MHz CLK present at U14 pin-6 (Processor board)?
Is data activity present at TP4 (Clock Recovery)?
Is data activity present at U14 pin-15 (DG&R)?
Is data activity present at U13 pin-5 (DG&R board)?
Replace the DG&R board.
(45 Min.)
Replace the LAB Interface.
(45 Min.)
Replace the Mother/User Interface board.
(45 Min.)
Replace the Clock Recovery board.
(45 Min.)
Replace the Mother/User Interface board.
(1 Hr.)
Refer to Troubleshooting Tree 7.22.
(1 Hr.)

7.29 Troubleshooting Tree

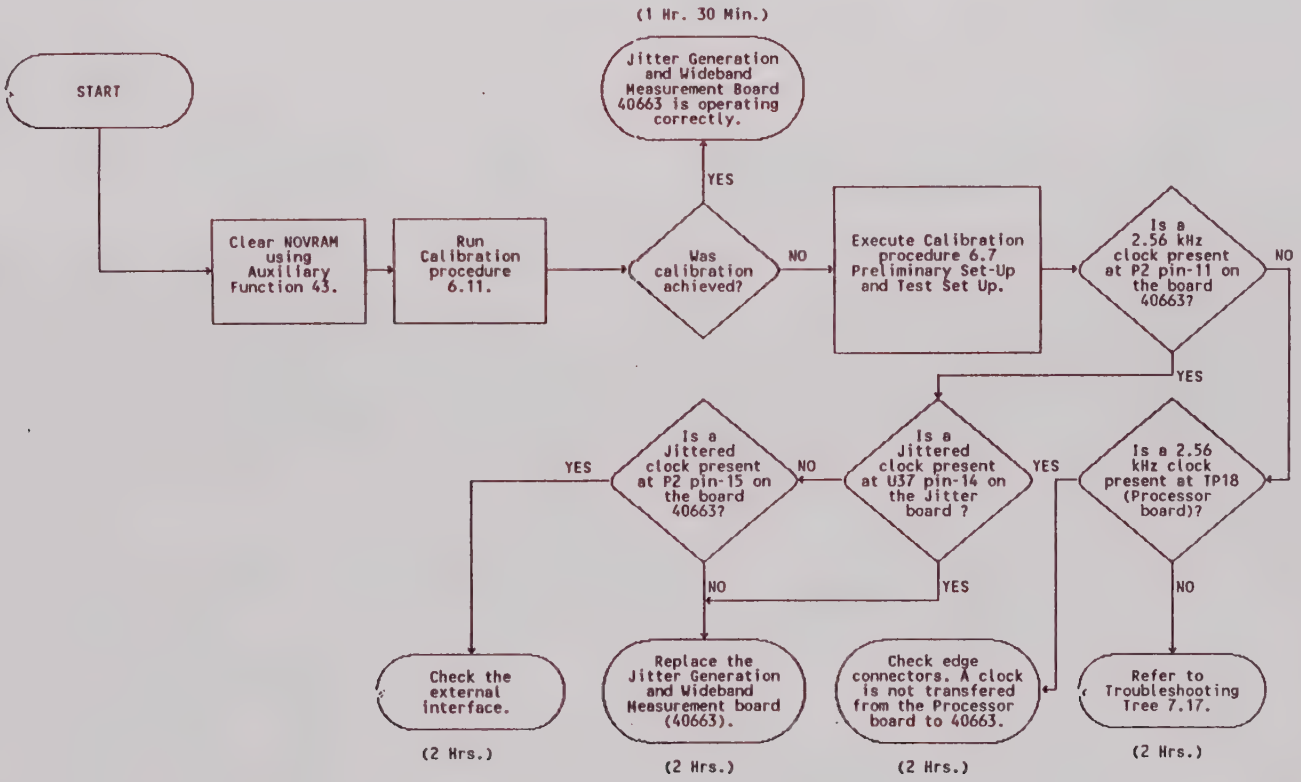
Unable to print when using the IEEE-488 Interface Option 6005.

Unable to enter Remote Mode when using the IEEE-488 Interface Option 6005.

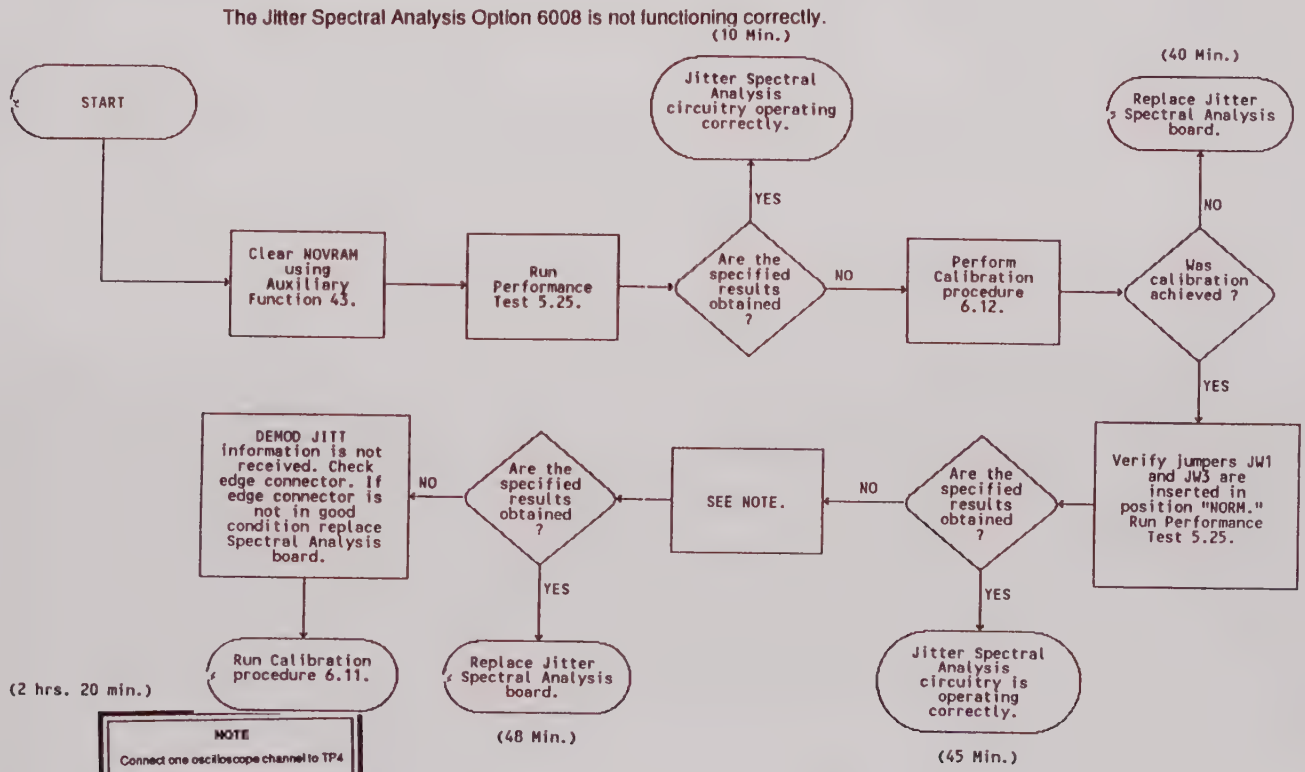

START
Do not use the Processor Extender board (40468)when configuring the FIREBERD. Connect the Processor board directly to the Mother/User Interface Assembly.
Clear NOVRAM using Auxiliary Function 43.
Run Performance Test 5.24.
Are the specified results obtained?
NO
YES
(50 Min.)
The IEEE-488 Interface circuitry is operating correctly.
Is 5V present at cathode CR2 (IEEE-488 Interface board) ?
NO
YES
(51 Min.)
Refer to Troubleshooting Tree 7.5.
Is 5 V present at TP-39 (Processor board)?
NO
YES
Is a 1.5 MHz signal present at U2 pin-3 (IEEE-488 Interface board)?
NO
YES
Is a 1.5 MHz signal present at U69 pin-8 (Processor board)?
YES
NO
The 15 MHz / 5 V signal is not being transfered from the Processor board to the IEEE-488 Interface board.
Replacing the IEEE-488 Interface board.
(52 Min.)
Refer to Troubleshooting Tree 22.
(53 Min.)
Check edge connector for signs of electrical contact impairment.
(55 Min.)

7.30 Troubleshooting Tree

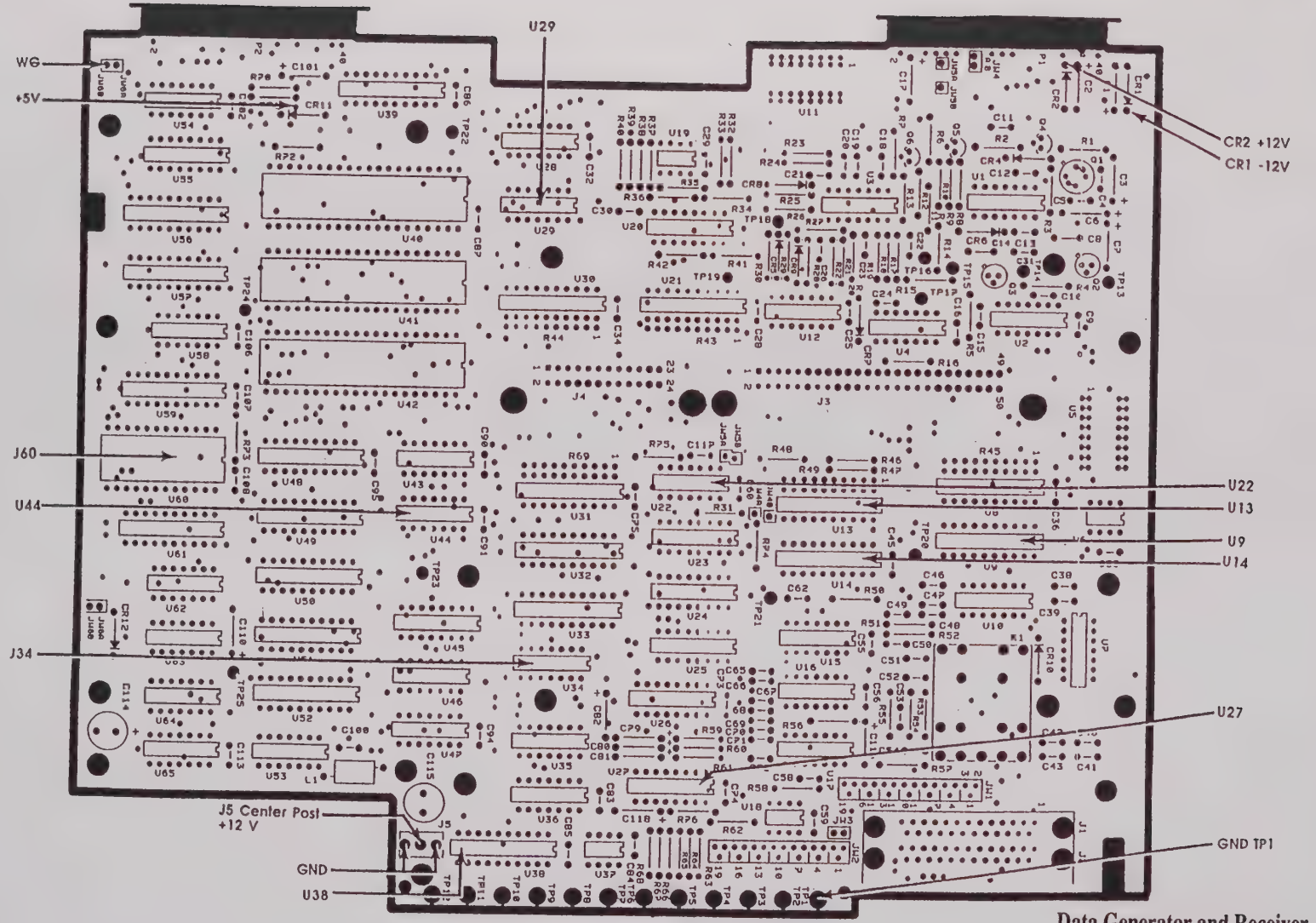
The Jitter Generation and Widebnad Measurement Option 6007 is not functioning correctly.


START
Clear NOVRAM using Auxiliary Function 43.
Run Calibration procedure 6.11.
Was calibration achieved?
NO
YES
(1 Hr. 30 Min.)
Jitter Generation and Wideband Measurement Board 40663 is operating correctly.
Execute Calibration procedure 6.7 Preliminary Set-Up and Test Set Up.
Is a 2.56 kHz clock present at P2 pin-11 on the board 40663?
NO
YES
Is a 2.56 kHz clock present at TP18 (Processor board)?
YES
NO
Refer to Troubleshooting Tree 7.17.
(2 Hrs.)
Is a Jittered clock present at U37 pin-14 on the Jitter board ?
YES
NO
Check edge connectors. A clock is not transfered from the Processor board to 40663.
(2 Hrs.)
Is a Jittered clock present at P2 pin-15 on the board 40663?
YES
NO
Replace the Jitter Generation and Wideband Measurement board (40663).
(2 Hrs.)
Check the external interface.
(2 Hrs.)

7.31 Troubleshooting Tree


The Jitter Spectral Analysis Option 6008 is not functioning correctly.
START
Clear NOVRAM using Auxiliary Function 43.
Run Performance Test 5.25.
Are the specified results obtained ?
YES
Jitter Spectral Analysis circuitry operating correctly.
(10 Min.)
NO
Perform Calibration procedure 6.12.
Was calibration achieved ?
NO
Replace Jitter Spectral Analysis board.
(40 Min.)
YES
Verify jumpers JW1 and JW3 are inserted in position "NORM." Run Performance Test 5.25.
Are the specified results obtained ?
NO
SEE NOTE.
Are the specified results obtained ?
NO
DEMOD JITT information is not received. Check edge connector. If edge connector is not in good condition replace Spectral Analysis board.
YES
Replace Jitter Spectral Analysis board.
(48 Min.)
YES
Jitter Spectral Analysis circuitry is operating correctly.
(45 Min.)
Run Calibration procedure 6.11.
(2 hrs. 20 min.)
NOTE
Connect one oscilloscope channel to TP4 (40683) or TP5 (40478). Run Performance Test 5.18 Test Set-Up. Press the RESTART button. The oscilloscope screen should display a sine wave which changes frequency every two seconds. As the frequency sweeps from 10 Hz to 40 kHz the amplitude decreases. The sweep takes approximately 90 seconds.

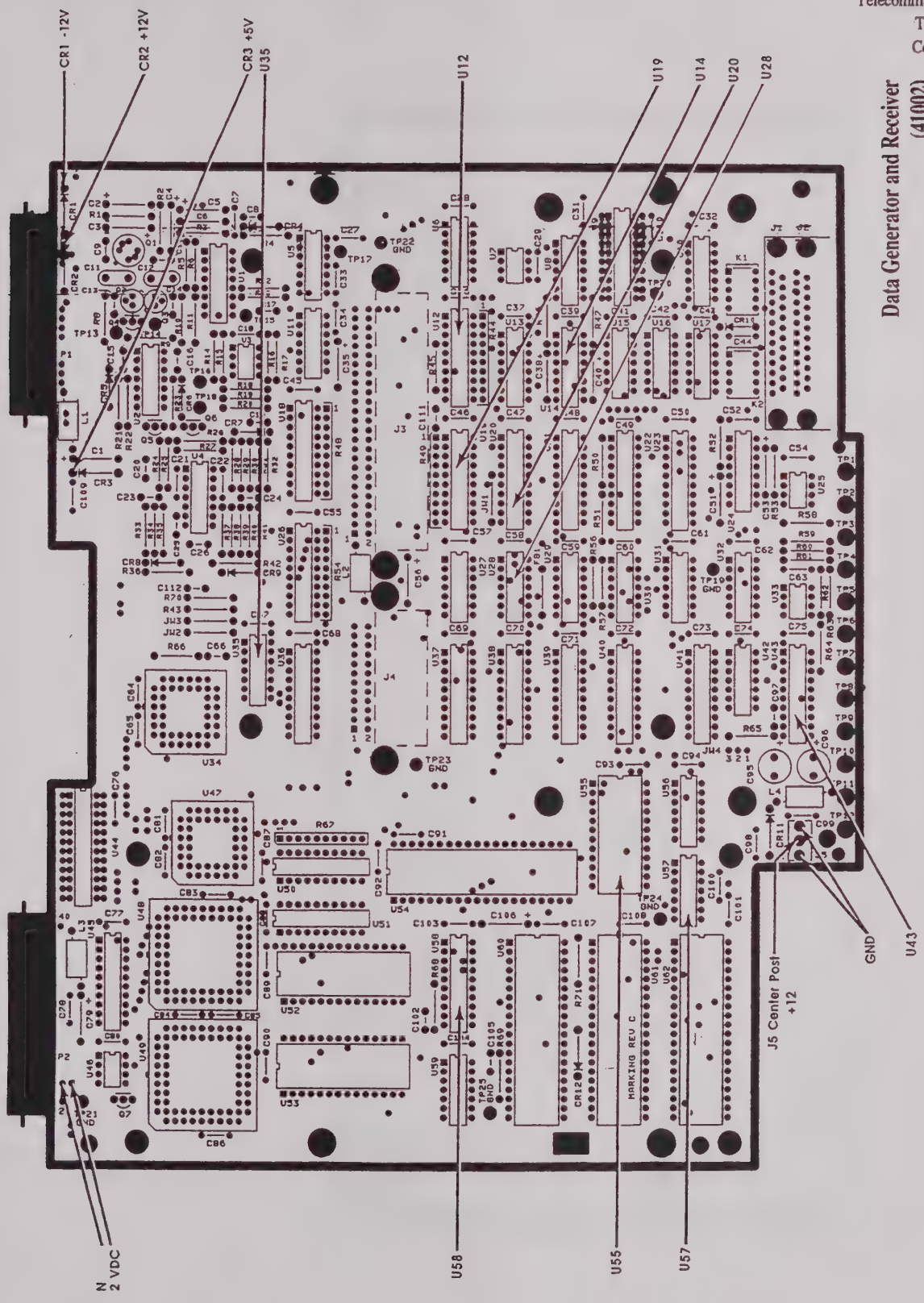
FIREBERD 6000 COMPONENTS

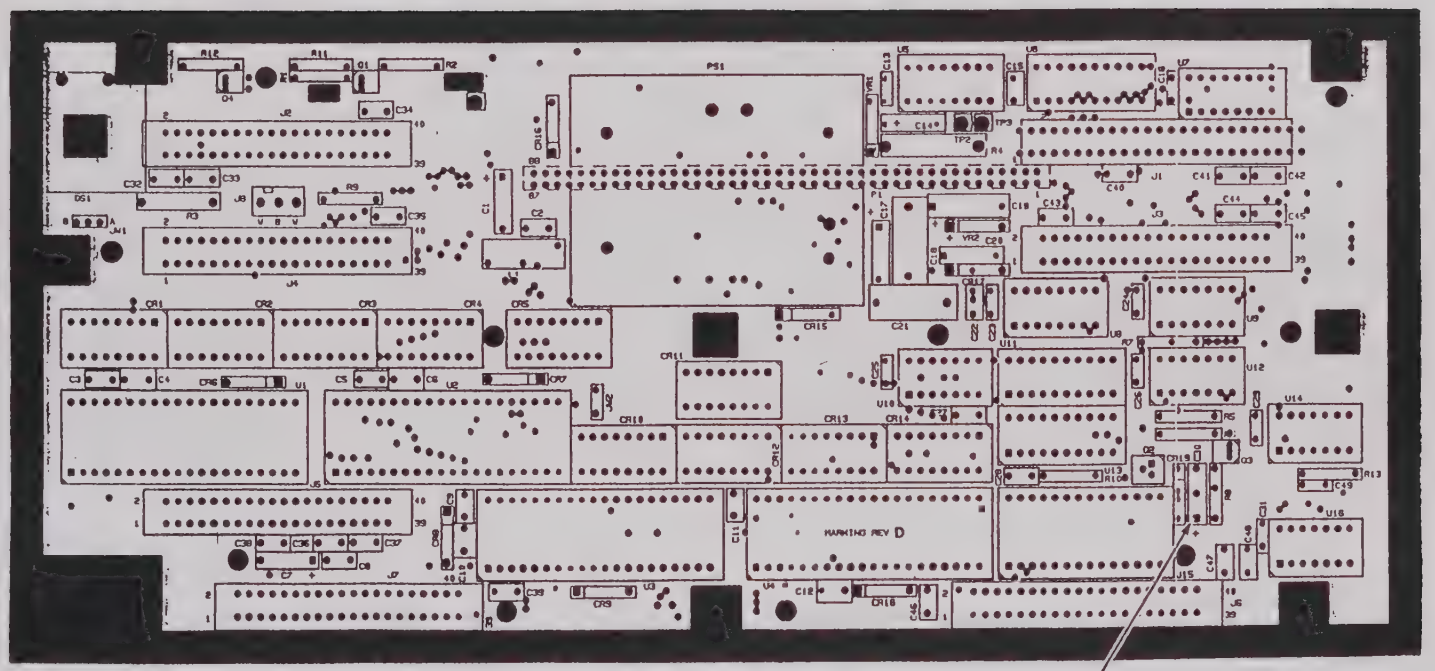


Data Generator and Receiver
(40445)

TIC ™
a Dynatech Company

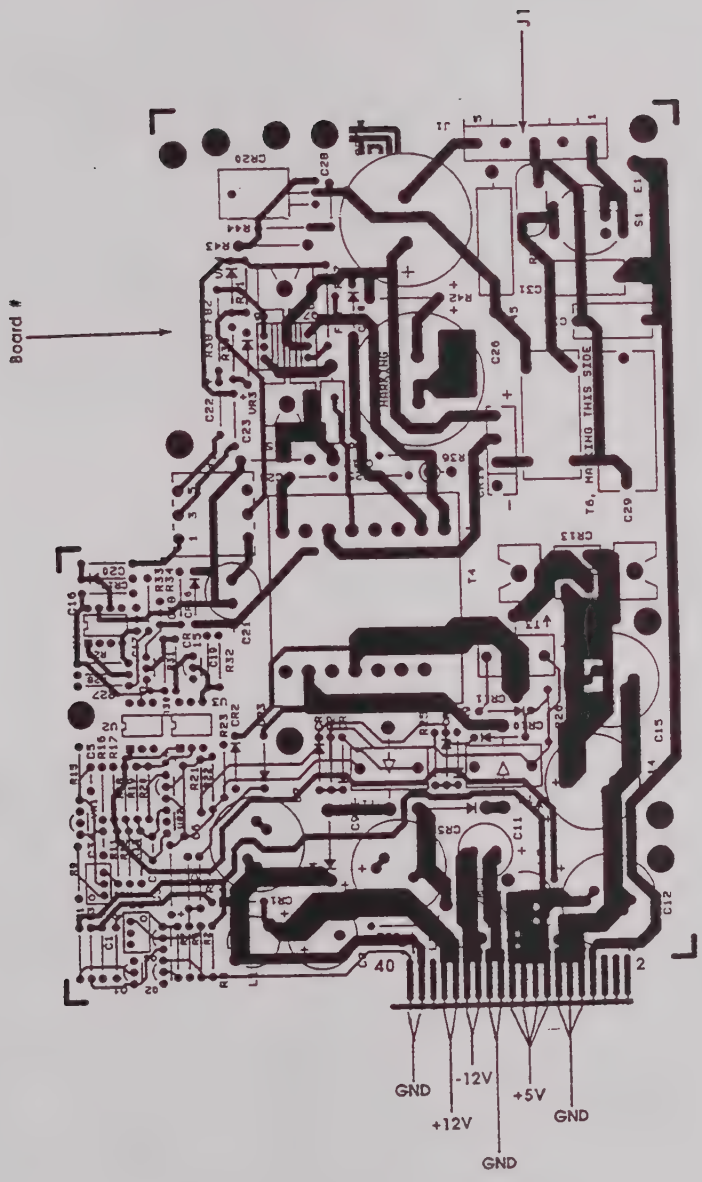
Data Generator and Receiver (41002)

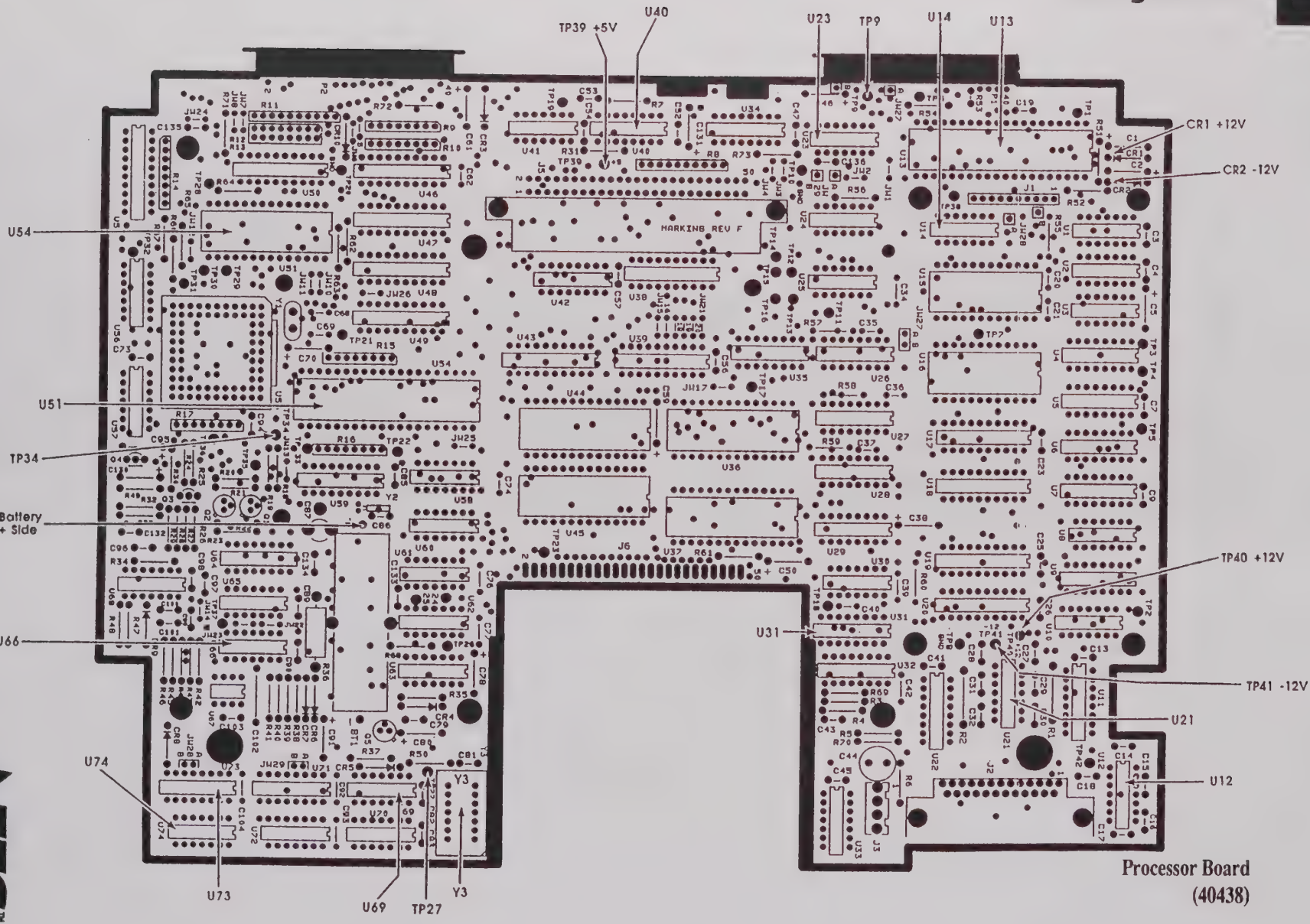




Motherboard
(40440)

TTC™
A Dynatech Company

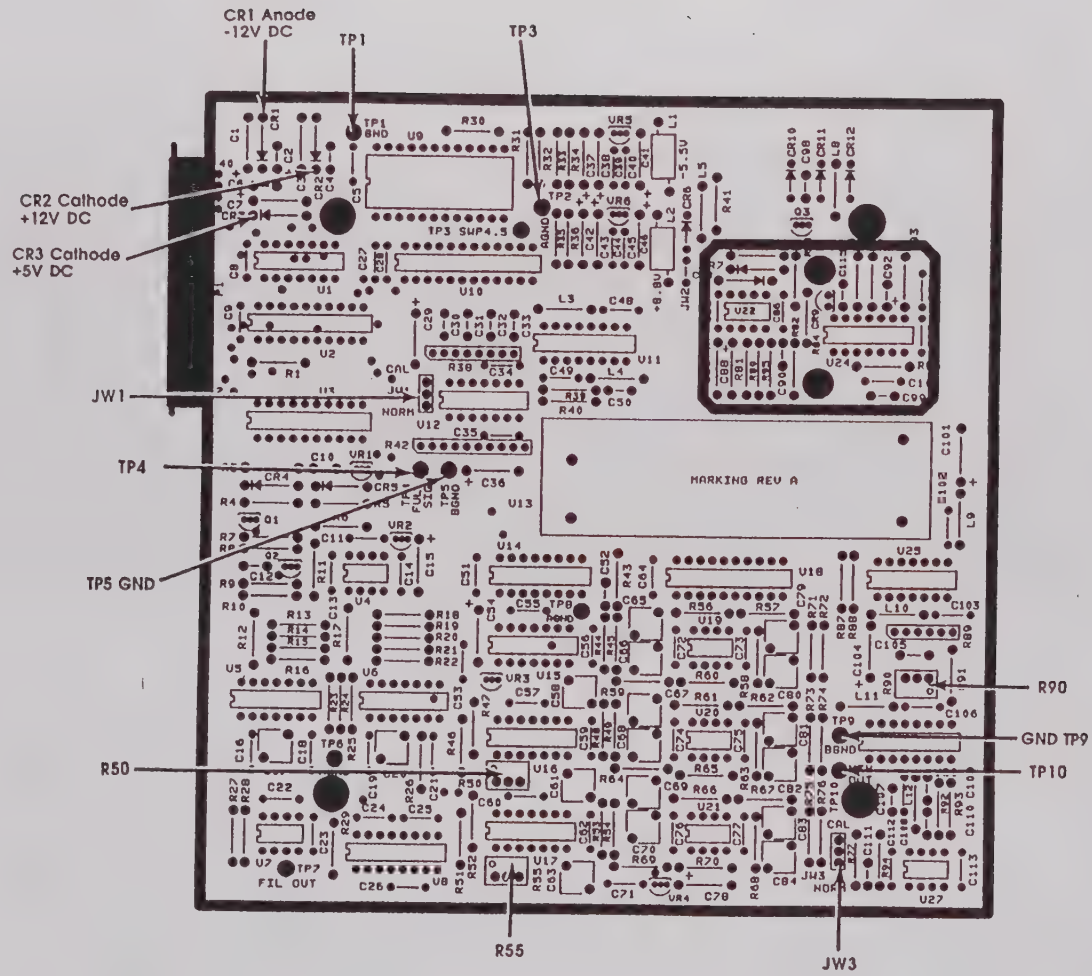

J1
Board #
40
2
GND
+12V
-12V
GND
+5V
GND



Processor Board
(40438)

TIC™
A Dynamed Company

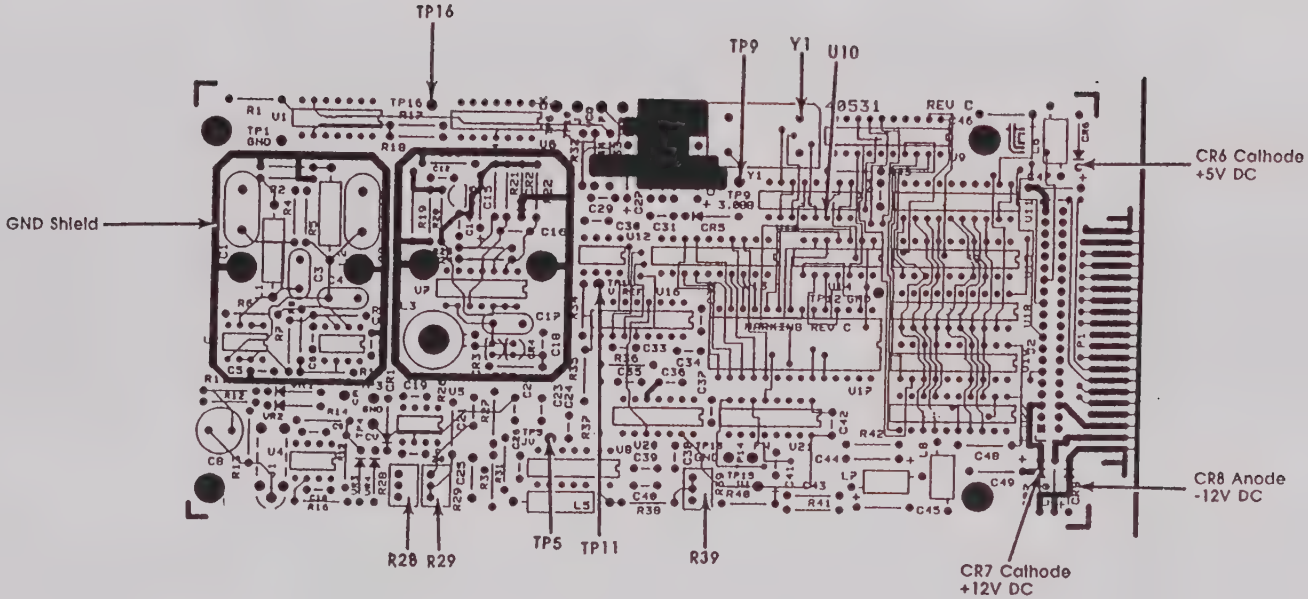
CR2 Anode
-12V DC
C85 -Negative
Side GND
JW1
CR1 Cathode
+5V DC
CR3 Cathode
+12V DC
MARKING REV F
TP2 GND
R10
TP3
TP5 GND
R36
TP4



DS1 Jitter Spectral Analysis
Option 6002 (40683)

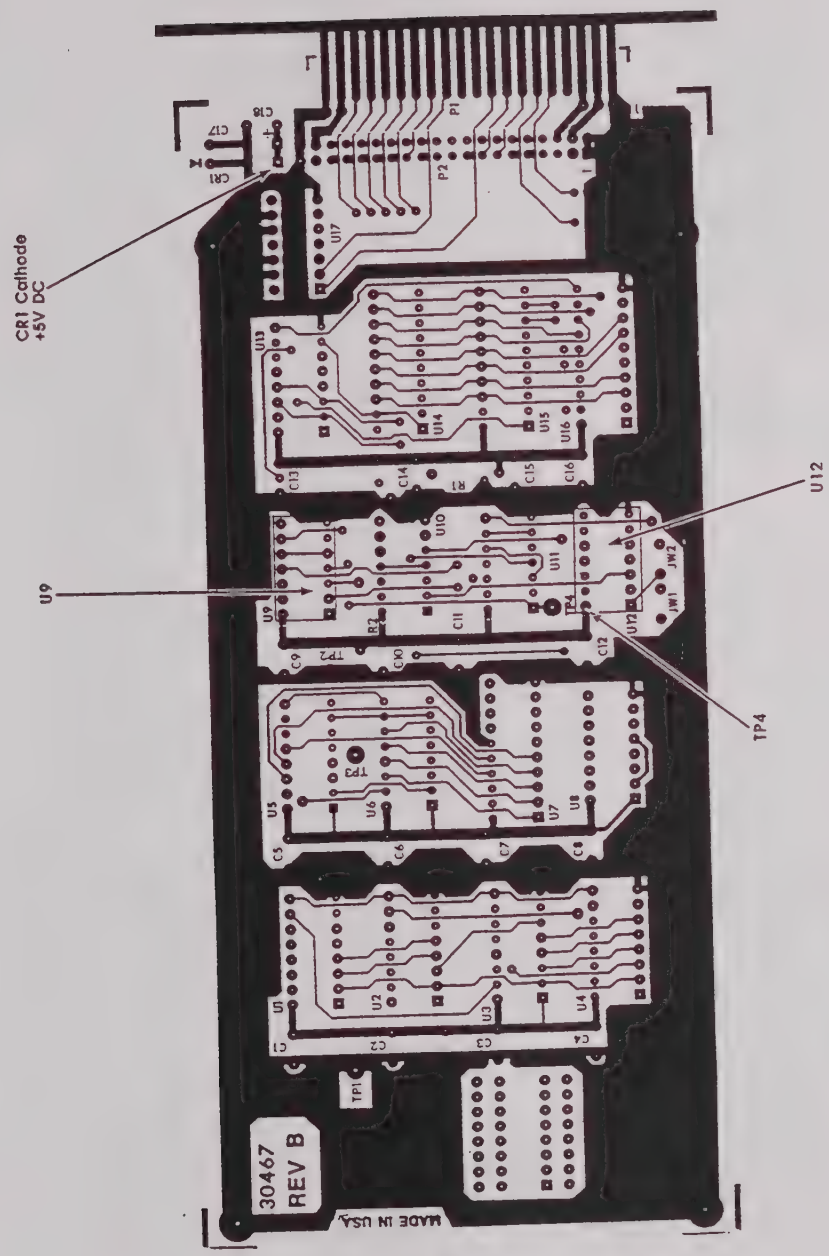
TTC
A Dynatech Company

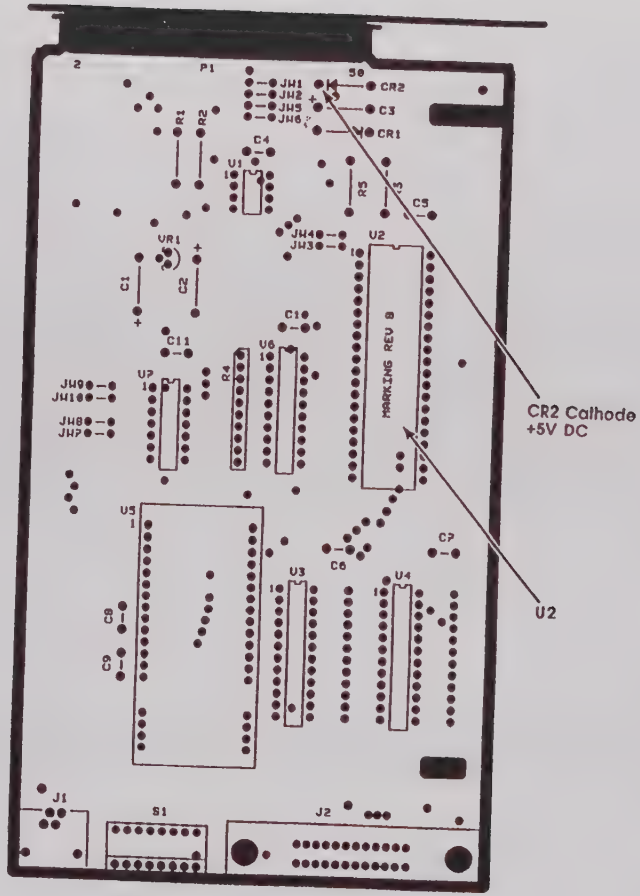
R109
U34
R92
TP10
JW2
R106
TP2 GND
TP1
CR1 Anode
-12V DC
CR2 Cathode
+12V DC
CR3 Cathode
+5V DC
TP4 GND
TP5
JW1



DS1 Jitter Generator
Option 6003 (40531)

ITC™
A Dynatech Company

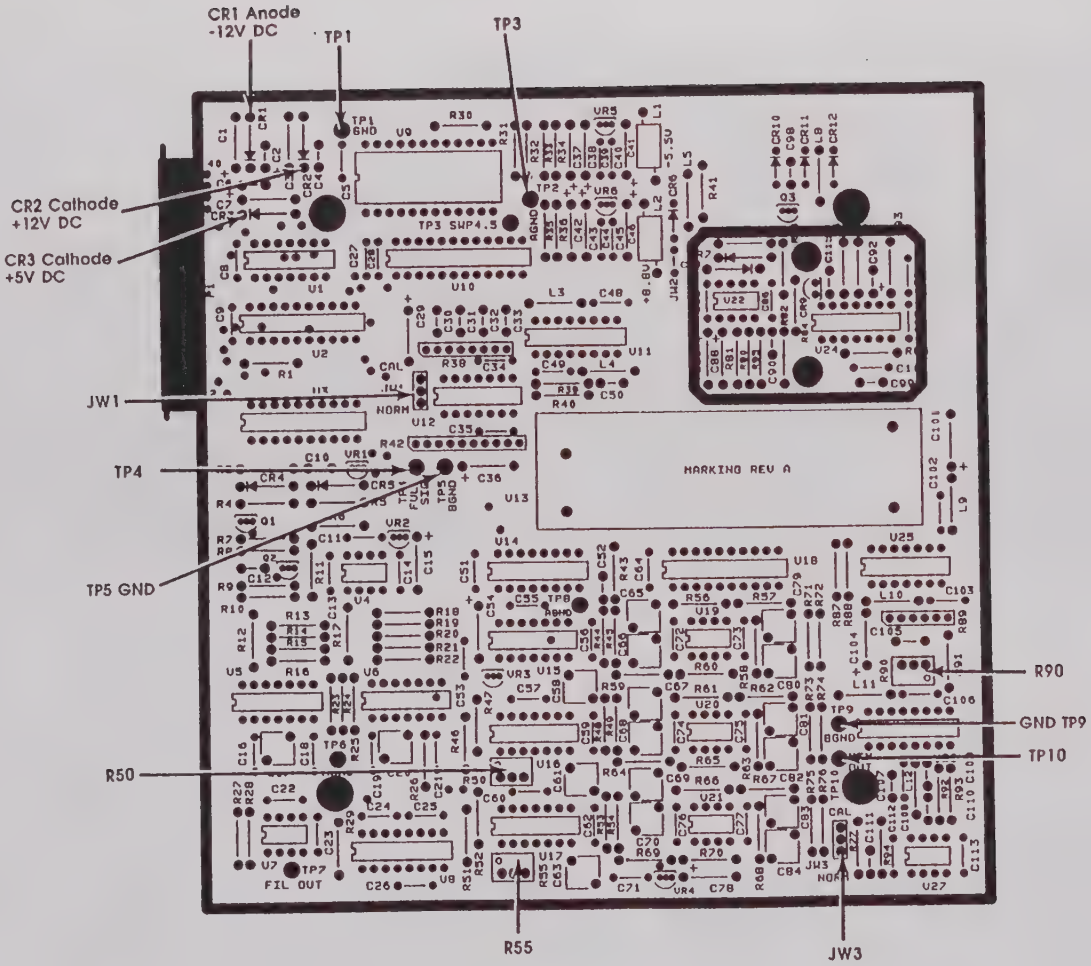

CR1 Cathode
+5V DC
U9
U12
TP4
30467
REV B
MADE IN USA



IEEE-488 Interface
Option 6005 (30468)

IIC™
A Dynatech Company

CR20
ANODE -12V
CR21
CATHODE +12V
CR22
CATHODE +5V
R71
JW1
R68
R135
U37
TP26
R124
R13
R7
R8
+5.12V
TP19
TP22
R52
TP16
TP17
R122
Y1
U46


CR1 Anode
-12V DC
TP1
TP3
CR2 Cathode
+12V DC
CR3 Cathode
+5V DC
JW1
TP4
TP5 GND
R50
R55
JW3
R90
GND TP9
TP10
MARKING REV A

WHITE
GREEN
BLACK
GND
NEUTRAL
LIVE LINE

GRAY
GRAY
WHITE
GIIEEN
BLACK
GND
NEUTRAL
LIVE LINE

FB6000
DRAWINGS AND SCHEMATICS

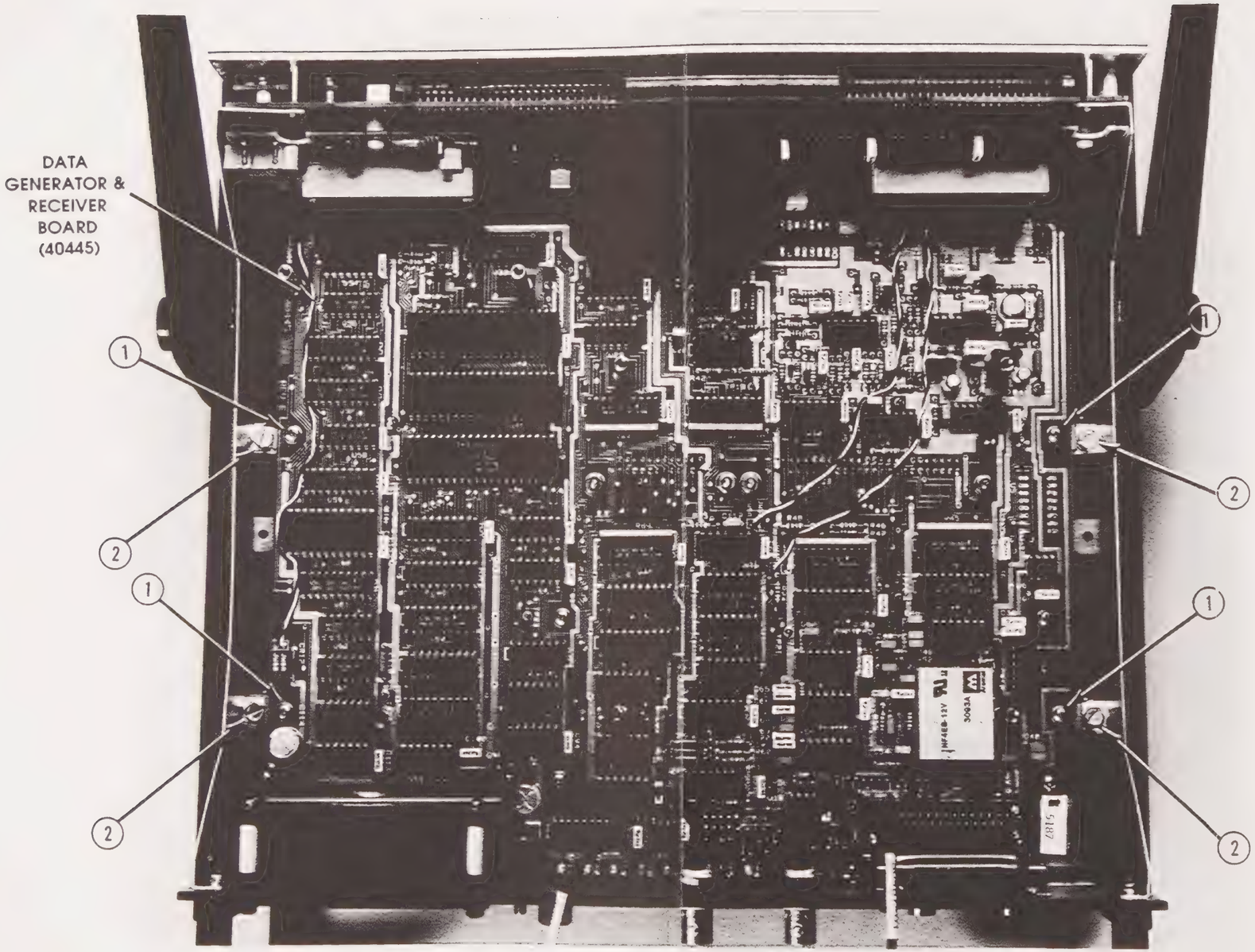


Figure 8A-1
Top View of FB-6000 Data Generator and Receiver Board

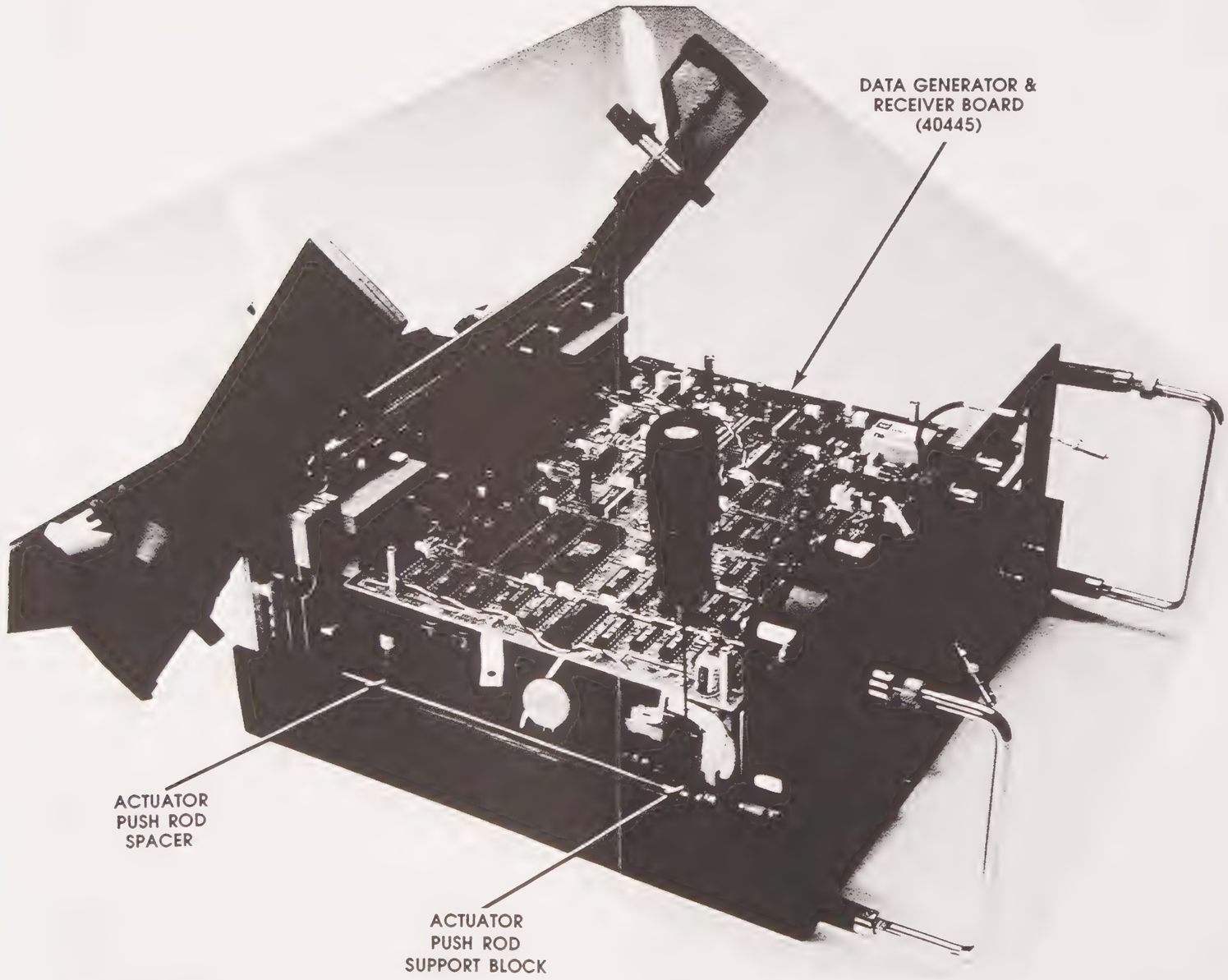


Figure 8A-2
Disassembly of FB-6000

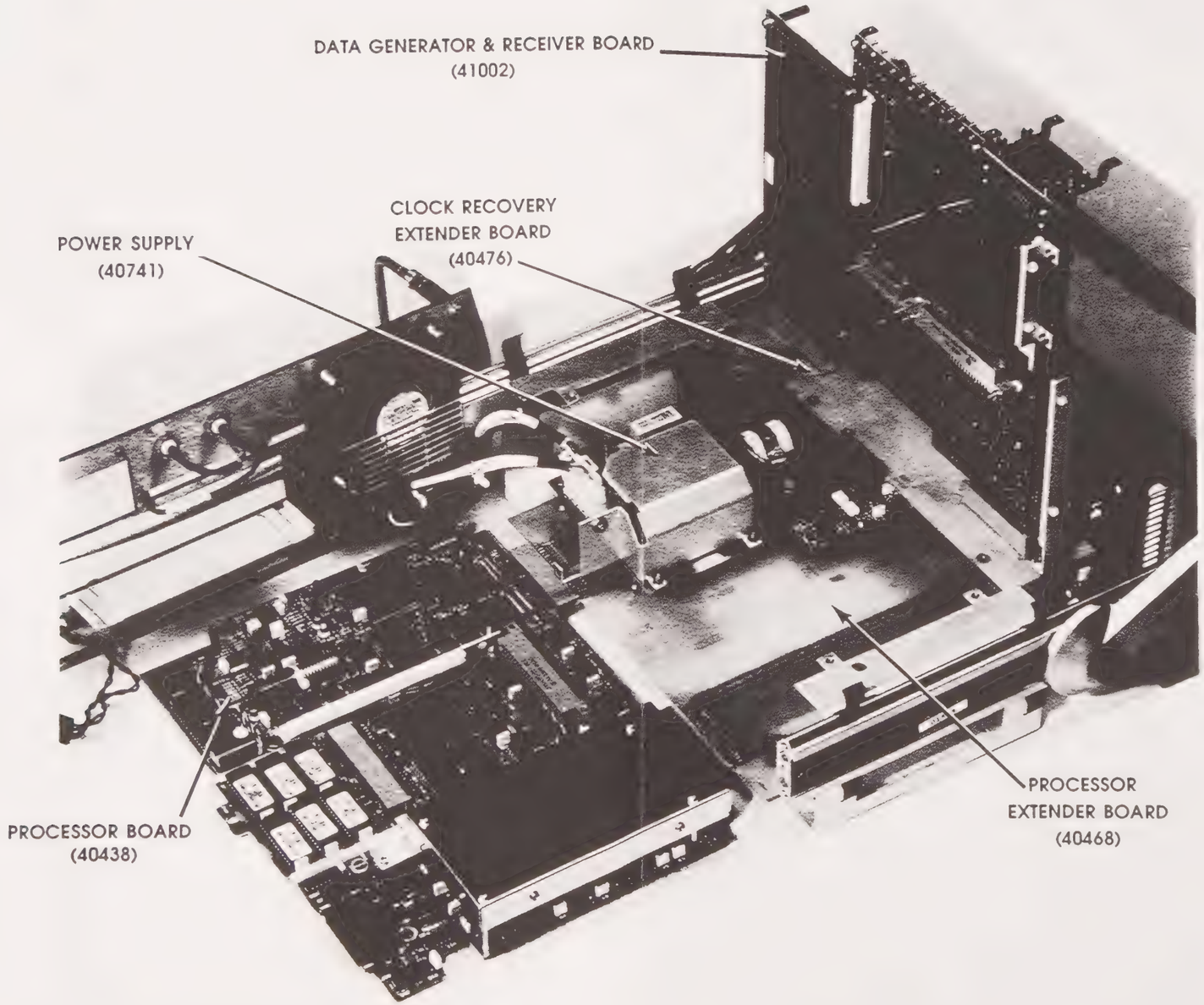


Figure 8A-3
FIREBERD Configured With Only Top Assembly

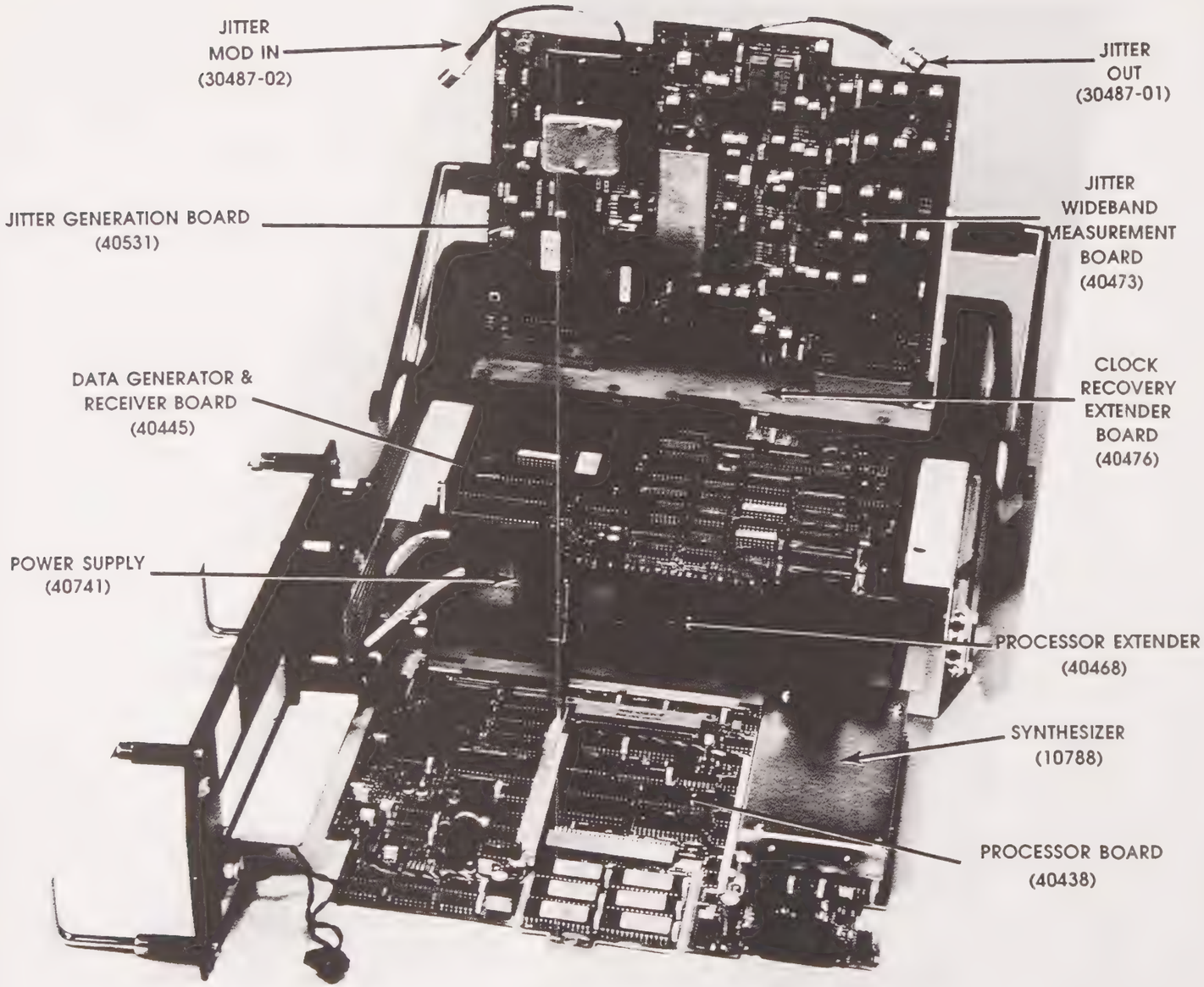


Figure 8A-4
FIREBERD Configured DS1 Jitter Options 6001, 6002 and 6003

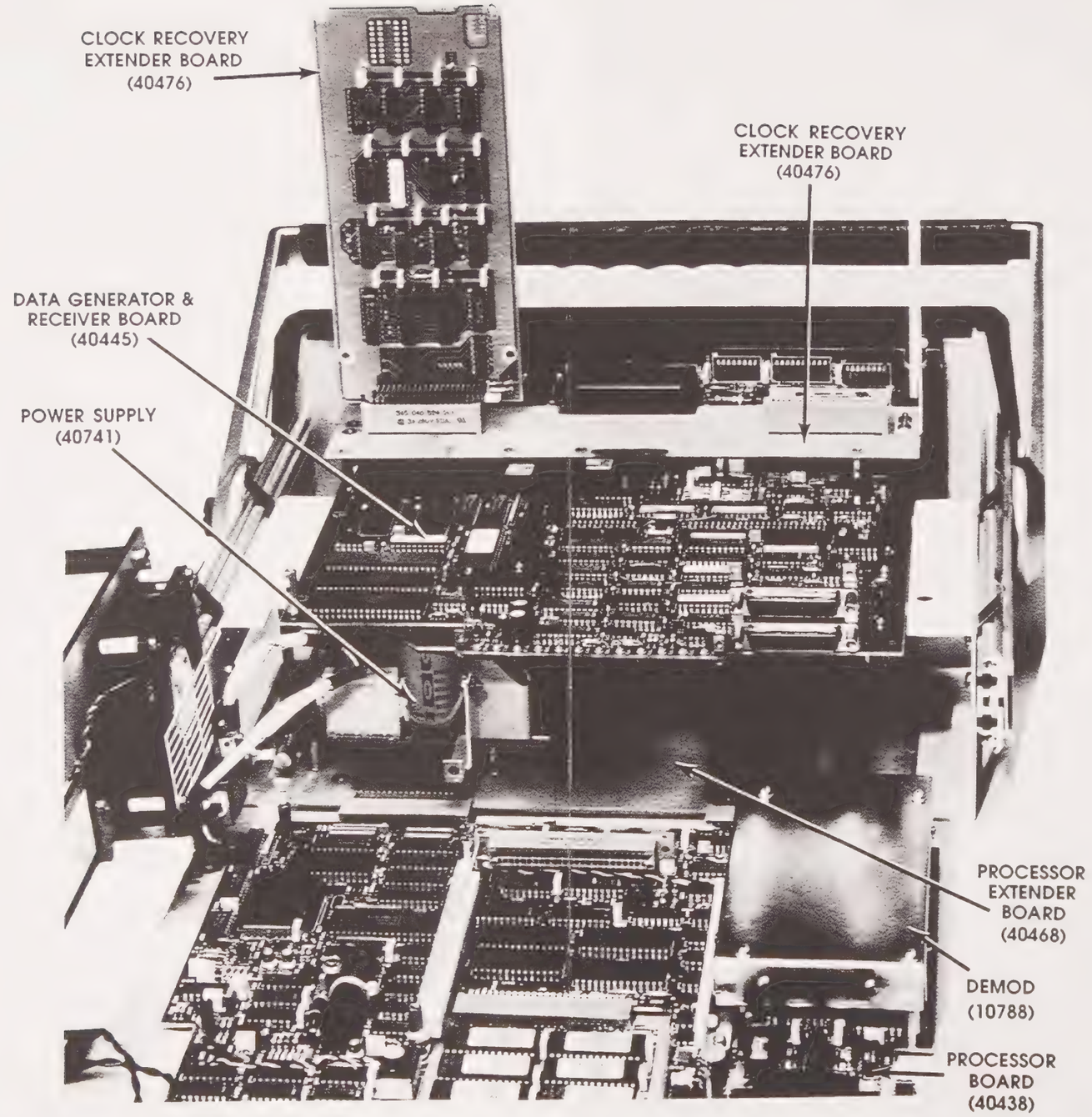


Figure 8A-5
FIREBERD Configured With Clock Recovery Option 6004

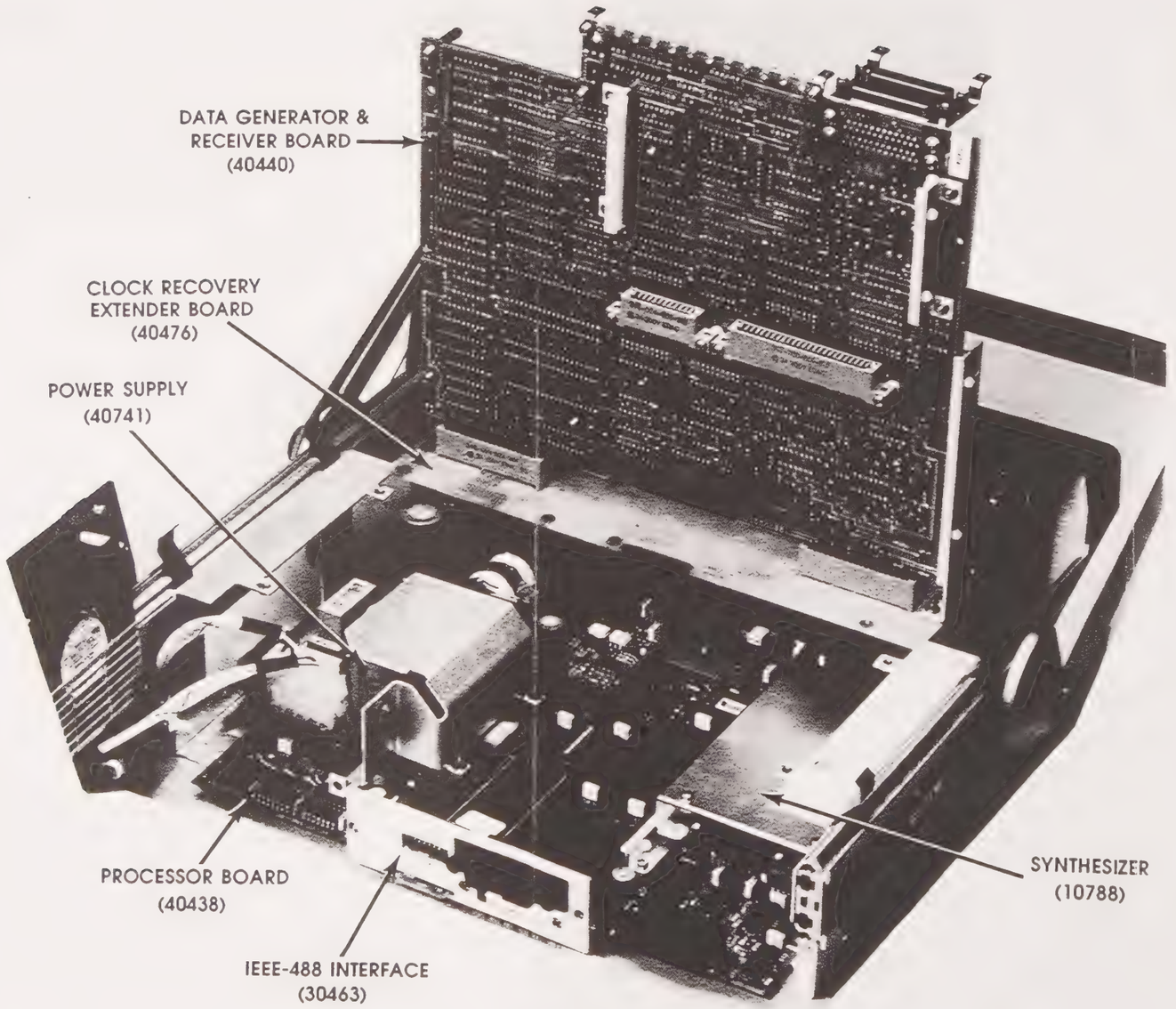


Figure 8A-6
FIREBERD Configured With IEEE-488 Interface Option 6005

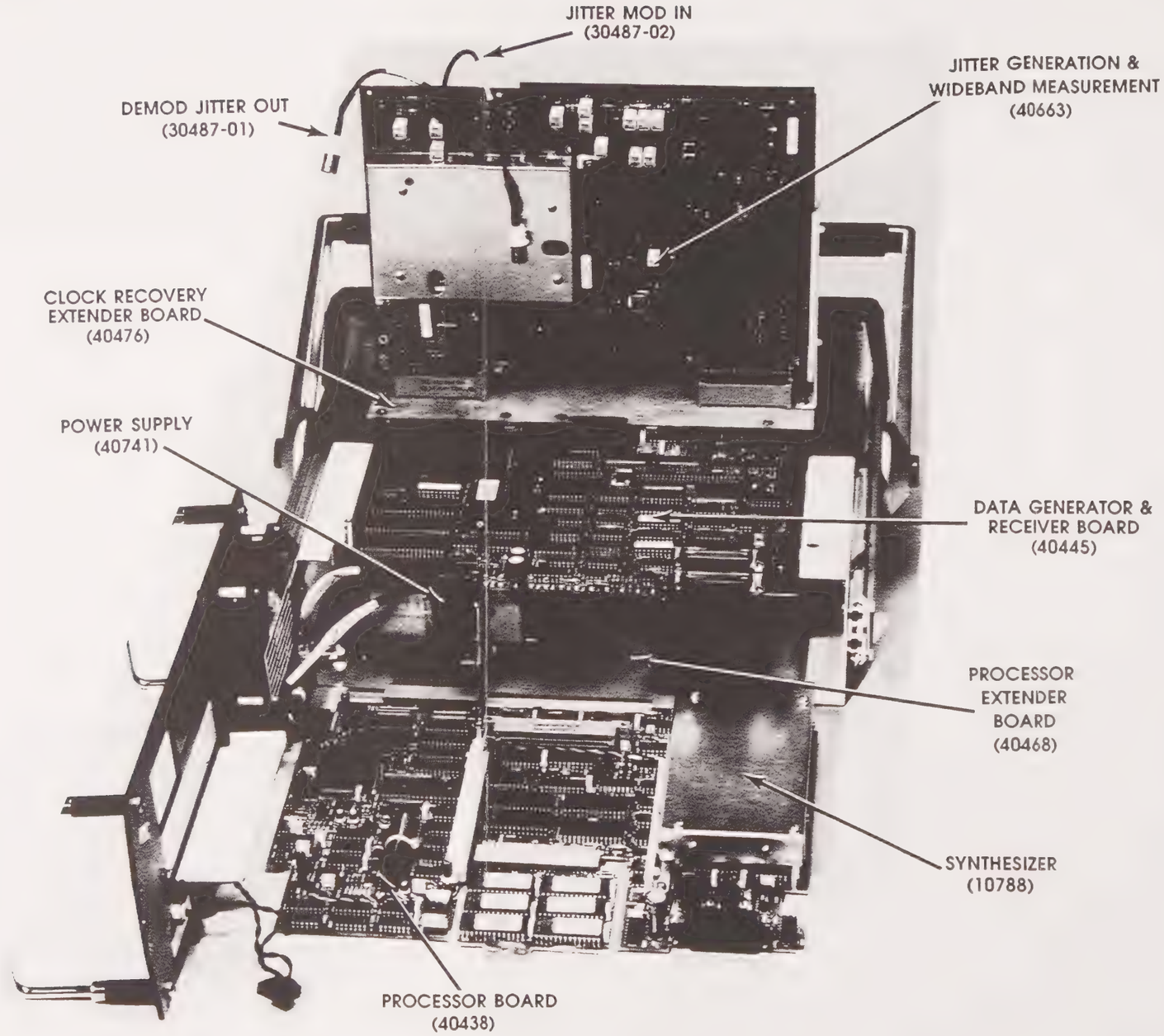


Figure 8A-7
FIREBERD Configured With Jitter Options 6007 and 6008

NOT SHOWN:

BACK POUCH
FRONT & REAR PROTECTIVE COVERS

FIREBIRD 6000

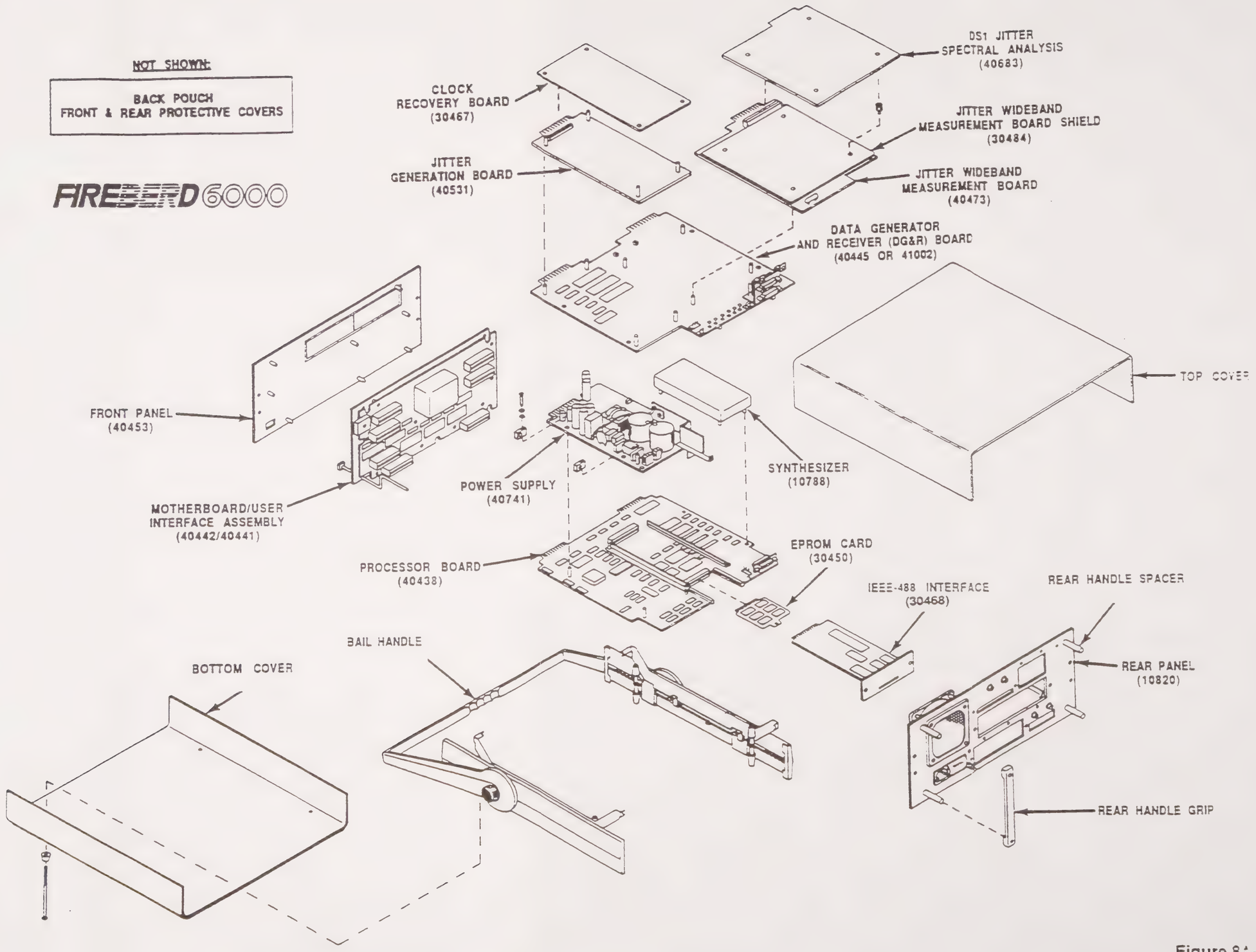


Figure 8A-3
Exploded View of FB6000
With Options 6001, 6002, 6003, 6004 and 600

NOT SHOWN:

BACK POUCH
FRONT & REAR PROTECTIVE COVERS

FIREBIRD 6000

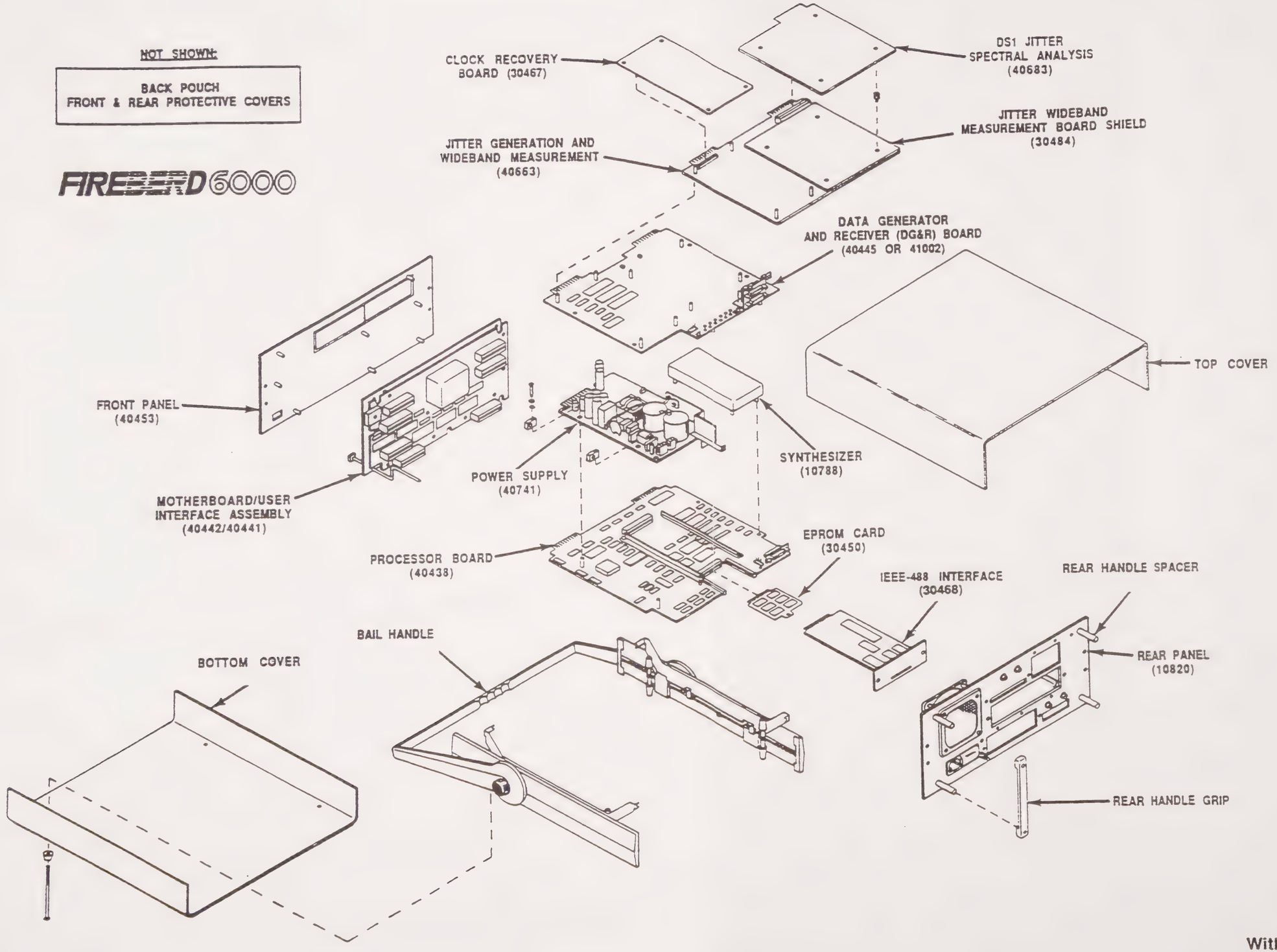
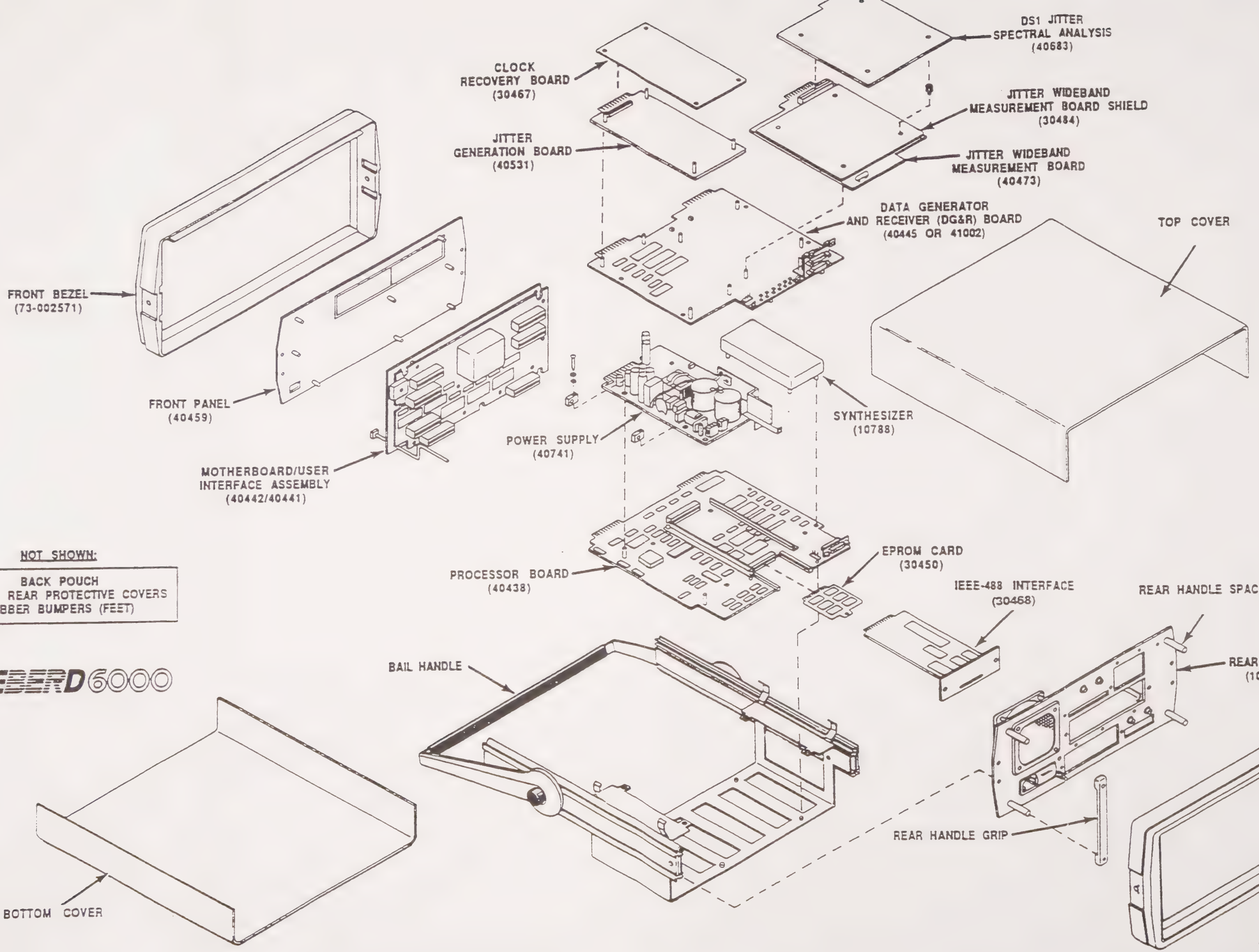


Figure 8A-9
Exploded View of FB6000
With Options 6004, 6005, 6007 and 6008

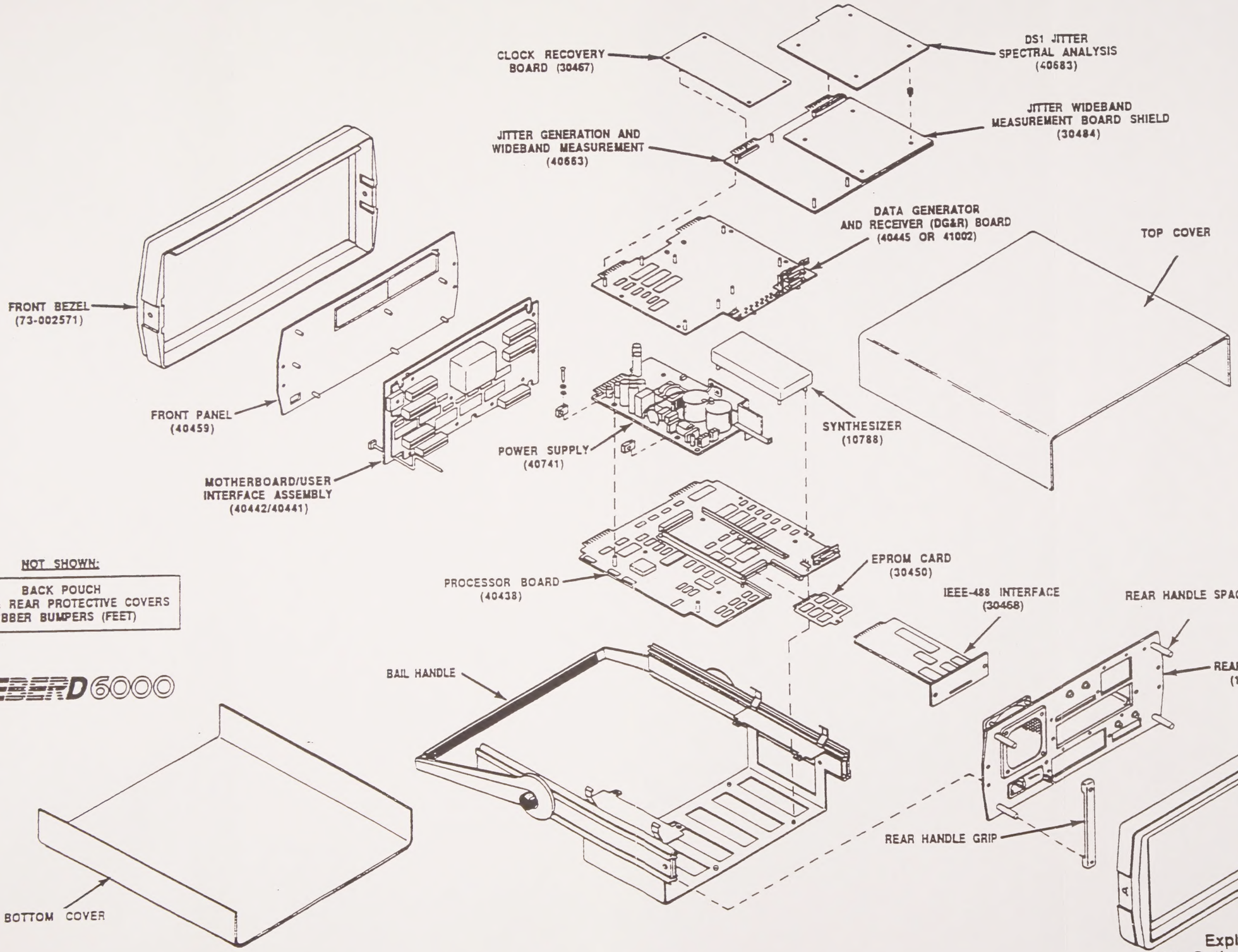


NOT SHOWN:

BACK POUCH
FRONT & REAR PROTECTIVE COVERS
RUBBER BUMPERS (FEET)

FIREBIRD 6000

Figure 8A-10
Exploded View of MC6000
With Options 6001, 6002, 6003, 6004 and 60



NOT SHOWN:

BACK POUCH
FRONT & REAR PROTECTIVE COVERS
RUBBER BUMPERS (FEET)

FIREBIRD 6000

Figure 8A-11
Exploded View of MC6000
With Options 6004, 6005, 6007 and 600